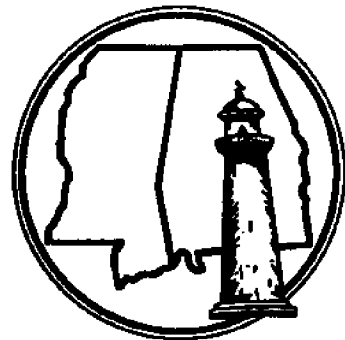


THE ECONOMIC AND ENVIRONMENTAL STRUCTURE OF ALABAMA'S COASTAL REGION, PART I: ECONOMIC STRUCTURE

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SEA GRANT PROGRAM**



MASGP-79-016

THE ECONOMIC AND ENVIRONMENTAL
STRUCTURE OF ALABAMA'S COASTAL REGION

PART I: ECONOMIC STRUCTURE

Prepared Under A
Mississippi - Alabama Sea Grant
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by

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(ABSTRACT)

Complex economic interactions and interdependencies exist within the industrialized economy of the United States. A knowledge and understanding of these linkages is important for those charged with making decisions regarding economic development and planning.

The information presented in this report is the result of a research project designed to develop an input-output model of the Alabama coastal counties--Mobile and Baldwin. In building this general model, the following objectives were met:

1. To develop a transactions table illustrating the flows of goods and services between all major economic sectors of the Mobile-Baldwin County area;
2. To determine the direct, indirect, and induced effects of changes in the economic activity of the area; and,
3. To develop output, income, and employment multipliers for the major producing sectors of the area.

Achievement of these objectives has provided economic data which will be useful to planners and governmental agencies in establishing policies and programs for the Alabama Coastal Region.

In addition to giving the transactions table, the direct, indirect and induced effects, and the output, income and employment multipliers, detailed explanations were given in the report on how the model was developed and the data were collected. Such information will be valuable for analysts in updating the model as more data become available, and for those interested in constructing similar models.

PREFACE

The work upon which this report was based was financed in part by funds provided by Mississippi-Alabama Sea Grant. The theoretical and computational developments were undertaken by researchers in the Department of Agricultural Economics and Rural Sociology at Auburn University. Any errors of fact, logic, or judgment in the report are the responsibility of the authors.

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The assistance of Mrs. Dorothy King of the Unemployment Compensation Agency, Mobile, Ala., in providing data on employment, and the assistance of Mr. Ira David George of the Geological Survey of Alabama, University of Alabama in providing data on mining production are gratefully acknowledged. Mr. Peter Trenchi and Dr. Warren Flick, Department of Forestry, Auburn University, Auburn, Ala., provided the coefficients for the government sectors. Computer programs used in the analysis were provided by Dr. Wayne Curtis and Dr. Bill Smith, Center of Business and Economic Research, Troy State University, Troy, Ala. The authors wish to extend their gratitude to the many other individuals and organizations who provided assistance to this project.

TABLE OF CONTENTS

INTRODUCTION	1
OBJECTIVES	2
PROCEDURE	2
Specifications of Sectors	2
Data Assimilation	3
RESULTS	4
Transactions Table	4
Direct Requirements Table	5
Direct and Indirect Requirements Table	9
Multipliers	22
USE OF THE INPUT-OUTPUT MODEL	26
SUMMARY AND CONCLUSIONS	38
REFERENCES	42
APPENDIX A: SECTOR WORKSHEETS	50
APPENDIX B: FINAL DEMAND AND FINAL PURCHASES	116
APPENDIX C: AGGREGATION, REGIONALIZATION, AND BALANCING OF THE TRANSACTIONS MATRIX	119

LIST OF TABLES

Table	Page
1. Transactions Table Alabama Coastal Region--Base Year (in Thousands of Dollars)	6
2. Direct Requirements Table - Alabama Coastal Region	10
3. Direct and Indirect Requirements Table - Alabama Coastal Region	13
4. Direct, Indirect, and Induced Requirements Table- Alabama Coastal Region	19
5. Type I Multipliers - Alabama Coastal Region	23
6. Type II Multipliers - Alabama Coastal Region	24
7. Change in Household Income Resulting From a \$ One Million Change in Sales to Final Demand, By Sector Alabama Coastal Region	27
8. Change in Employment Resulting From a \$ One Million Change in Sales to Final Demand, By Sector, Alabama Coastal Region	28
9. Aggregation of Expenditures for Pet Food Plant into Sectors in Regional Model	30
10. Aggregation of Expenditures for Resort Complex into Sectors in Regional Model	31
11. Effect of Pet Food Plant on Regional Income and Employment: Example	33
12. Effect of Resort Complex on Regional Income and Employment: Example	34
13. Comparison of Impact of Pet Food Plant and Resort Complex on Region: Example	36
A1. Summary of Control, Data for Alabama Coastal Region Input-Output Study	52
A2. Example of Data Definition Check (DDC): Construction	55

INTRODUCTION

The dynamic industrialized economy of the United States is characterized by a significant amount of specialization and division of labor. These features of the economic system make our high levels of productivity and standard of living possible. They also force a high degree of interdependence between all sectors of the economy. A knowledge and understanding of these economic interactions is important for those concerned with economic development and planning. It is necessary to realize that any actions by a particular segment are going to influence economic activity in other portions of the economy.

Increased interest has been expressed in recent years over economic interactions which exist in the coastal regions of our country. Concern over these interrelationships has risen because of the nature of the resources present in these areas. Water-related activities play an important part in the economic life of the coastal zone. The preservation and conservation of water resources are necessary for many water-based industries to survive and prosper.

Because of the unique environmental and economic problems in coastal areas, this study was initiated to determine the economic relationships existing between the major industrial and producing sectors of coastal Alabama (i.e., Mobile County and Baldwin County). This study provides information which may be used by industry, planners, and government agencies in examining the overall actions of the coastal economy and how each specific industry contributes to and interacts with the overall system.

OBJECTIVES

The specific objectives of the research presented in this report were:

1. To develop a transactions table illustrating the flows of goods and services between all major economic sectors of the Mobile-Baldwin County area;
2. To determine the direct, indirect, and induced effects of changes in the economic activity of the area; and
3. To develop output, income, and employment multipliers for the major producing sectors of the area.

PROCEDURE

Input-output analysis was selected as the basic means for evaluating economic interactions in the coastal zone of Alabama. This procedure, introduced in the 1930's by Nobel laureate economist Wassily Leontief [28], has proved to be a useful tool in analyzing economic activity and in explaining how various segments of the economy influence each other. Many studies have been conducted using the input-output method to describe the economic structures of nations and regions and for analysis of industrial and regional development strategies [11]. The procedure combines national accounting methods with mathematical economics and has risen to its full potential only with the advent of high-speed computer technology. A complete and detailed explanation of how the procedure works may be found in Miernyk [30] or Farag [8].

Specification of Sectors

The first step in constructing a regional input-output model is to decide the number and type of economic sectors which will be included. The majority of sectors in the regional model were chosen from the 85-

industry 1971 U. S. National Input-Output model [57]. Exceptions were Fresh or Frozen Packaged Fish, Greenhouse and Nursery Products and Water Transportation which were developed from the 367-industry 1967 National model 55 ; and Fishery Products and Forestry Products which had to be developed from various data sources since they were not disaggregated even in the most highly disaggregated (484-industry) national model. Using the AGGATE program (see Appendix C), the 85-industry national model was aggregated into 29 regional sectors. Of the 52 manufacturing sectors in the 1971 national model, 22 were well represented in the region and were combined into ten regional sectors under somewhat broader headings (one to four national sectors per regional sector). Most of the other sectors in the regional model followed the national sector classification, with some greater degree of aggregation in Communications and Utilities, and Other Services. Sectors in the national model which had no representation in the region, as determined by an examination of the Alabama Directory of Mining and Manufacturing [41], were assigned to the Imports sector. A detailed explanation of the components of each sector is presented in Appendix A.

Data Assimilation

Coefficients for use in an input-output analysis may be obtained from either primary or secondary data sources. Primary data are obtained by surveying establishments within the study region to determine their purchases from and sales to other economic entities. This type of data is specific to a region and gives an accurate description of the structure of the economy. A major handicap in securing such data is the time and expense involved in conducting a statistical survey.

It was decided that secondary data would be used to develop the input-output model for this study. The basis for the data was the most

recently updated Bureau of Economic Analysis National Input-Output model [57]. Obviously, regional economic interactions are not the same as those which exist for the nation as a whole. A region would not be as self-sufficient as the nation and would depend more heavily on purchases of imports. A region could also be expected to export a greater proportion of its output. In addition, comparative advantages would be likely in certain types of industries because of favorable factors in a given location, such as readily available raw materials, energy sources, transportation, or labor.

To account for obvious differences between the economic interactions in the study region and the nation, national data were adjusted using location quotients. This procedure weights input-output coefficients to represent the relative importance of that same industry to the nation. For example, the contribution of Printing and Publishing to the total regional economy is about half as much as its contribution to the national economy, as shown by its location quotient of 0.57 (Appendix A). A complete explanation of the procedure of adjusting by location quotients is presented in Appendix C.

Collection of data for the input-output model is the most time-consuming portion of the total analysis. Numerous secondary sources must be consulted and verified for consistency to obtain the necessary output and employment data. Some sectors were split into finer detail, and others were combined to conform to the sectoring scheme selected for the model. A list of sources used and discussions of modifications and adjustments are given in the appendices.

RESULTS

Transactions Table

The transactions table is the basic ingredient in an input-output

model (Table 1). As a regional accounting construct, the transactions table describes the purchases from and sales to all other sectors for a given year. In addition, it provides the foundation for predicting economy-wide consequences of specific economic changes in terms of output, income, and employment.

Each row in Table 1 represents the sales by the sector named at the left of the row to all other sectors. Reading across the first row, in the first cell, the Fishery Products sector sold \$0 to itself (that is, establishments within that sector sold little or none of their products to each other). Continuing across the row to non-zero entries, the Fishery Products sector sold \$13,775,000 to Fresh or Frozen Packaged Fish; \$157,000 to Other Transportation (such as motor freight, rail, and air); \$66,000 to State and Local Government; \$1,794,000 to Households (bought on the dock and consumed at home); and \$1,936,000 to Exports for a total of \$17,728,000 in sales in 1972.

Column entries represent the purchases that each sector named at the top of the column made from all other sectors. Thus, Fishery Products purchased goods or services worth \$351,000 from Food and Kindred Products (e. g. ice), \$351,000 from Apparel (e.g. nets) and so on down the column. Purchases from Households include primarily employee compensation (wages and salaries) and property-type income (dividends, interest, and rent). Note that the column total is the same as the row total for the first thirty producing or "endogenous" sectors, showing that all outputs (sales) and inputs (purchases) have been accounted for or "balanced".

Direct Requirements Table

While the transactions table is an essential starting point for all other analyses used in input-output studies and while it gives a detailed picture of the flow of goods and services in the economy, it is a static

TABLE 1
TRANSACTIONS TABLE
ALABAMA COASTAL REGION--BASE YEAR 1972
VALUES--IN THOUSANDS OF DOLLARS

INPUT (PURCHASES)	OUTPUT (SALES)									
	1	2	3	4	5	6	7	8	9	10
	FISHERY PRODUCTS	FRESH/FROZEN FISH	LIVESTOCK	CROPS	GREENHOUSE & NURSERY	FORESTRY PRODUCTS	AG. FOR. FISH SERVICES	PETROLEUM & NATURAL GAS	SAND & GRAVEL MINING	CONSTRUCTION
1 FISHERY PRODUCTS	0.	13775.	0.	0.	0.	0.	0.	0.	0.	0.
2 FRESH/FROZEN FISH	0.	292.	0.	0.	0.	0.	0.	0.	0.	0.
3 LIVESTOCK	0.	0.	1797.	693.	188.	127.	75.	0.	0.	0.
4 CROPS	0.	0.	6544.	920.	0.	582.	620.	0.	0.	0.
5 GREENHOUSE & NURSERY	0.	0.	0.	114.	691.	304.	17.	0.	0.	213.
6 FORESTRY PRODUCTS	0.	0.	0.	0.	0.	127.	0.	0.	0.	0.
7 AG. FOR. FISH SERVICES	0.	0.	224.	1043.	53.	204.	0.	0.	0.	428.
8 PETROLEUM & NAT. GAS	0.	0.	0.	0.	0.	0.	576.	0.	0.	0.
9 SAND & GRAVEL MINING	0.	0.	1.	123.	11.	0.	0.	278.	0.	2469.
10 CONSTRUCTION	0.	462.	103.	255.	57.	0.	724.	96.	0.	101.
11 FOOD & KINDRED EXCL2	351.	1892.	1844.	0.	0.	0.	0.	0.	0.	0.
12 APPAREL & TEXTILES	351.	27.	0.	38.	3.	0.	0.	0.	0.	0.
13 LUMBER & WOOD PROD.	0.	0.	2.	72.	1.	0.	0.	0.	0.	152.
14 PAPER & ALLIED PROD.	5.	1529.	9.	5.	7.	1.	0.	0.	0.	16281.
15 PRINTING & PUBLISH.	2.	0.	2.	7.	1.	0.	0.	0.	0.	831.
16 CHEM. PLAS. DRUG. PAINT	68.	137.	13.	2175.	151.	2.	18.	242.	206.	3906.
17 PETROLEUM REFINING	1587.	9.	83.	805.	56.	34.	4.	45.	276.	5532.
18 STORECLAY & GLASS	0.	0.	3.	13.	4.	2.	0.	96.	332.	12548.
19 FABRICATED METALS	52.	90.	7.	10.	4.	68.	2.	29.	11.	5052.
20 TRANSPORT. EQUIPMENT	2367.	0.	4.	14.	1.	0.	1.	0.	0.	13.
21 OTHER MANUFACTURING	541.	66.	1.	32.	20.	27.	10.	104.	111.	4164.
22 WATER TRANSPORTATION	0.	286.	20.	53.	13.	301.	1.	173.	43.	271.
23 OTHER TRANSPORTATION	0.	1446.	620.	429.	71.	297.	29.	116.	75.	7985.
24 COMMUNICATION & UTIL	321.	220.	107.	283.	74.	4.	2.	304.	342.	1319.
25 WHOLE & RETAIL TRADE	824.	1220.	123.	1317.	308.	26.	29.	308.	223.	26332.
26 FIN. INS. & REAL EST	1756.	352.	429.	2496.	177.	54.	81.	3963.	494.	3944.
27 HOTELS, RECREATION, SERV	0.	0.	4.	0.	0.	0.	0.	0.	0.	0.
28 EDUC. & HEALTH	0.	0.	98.	16.	2.	0.	0.	8.	1.	261.
29 OTHER SERVICES	27.	928.	102.	1121.	236.	6.	1.	373.	355.	13828.
30 STATE & LOCAL GOV'T	1438.	461.	1970.	2177.	603.	392.	117.	615.	249.	3698.
INDUSTRIOUS TOTALS	9690.	22800.	12010.	14019.	2598.	2550.	1174.	7678.	3228.	109340.
31 FEDERAL GOVERNMENT	320.	802.	353.	504.	153.	87.	26.	1930.	784.	18997.
32 HOUSEHOLDS	7591.	6378.	3285.	7254.	3214.	2120.	1299.	8028.	3422.	92904.
33 EXPORTS	327.	908.	204.	1028.	979.	64.	531.	8356.	3082.	83065.
TOTALS	17728.	10088.	15912.	22005.	6944.	9037.	1010.	26000.	10516.	304386.

TABLE 1 (Continued)

SECTOR	11	12	13	14	15	16	17	18	19	20	21	22	23
	FOOD & KINDRED EXCL 2	APPAREL & TEXTILES	LUMBER & WOOD PRODUCTS	PAPER & ALLIED PRODUCTS	PRINTING & PUBLISHING	DRUG, PLASTIC, PAINT	PETROLEUM REFINING	STONE, CLAY, & GLASS	FABRICATED METALS	TRANSPORTATION EQUIPMENT	OTHER MANUFACTURING	WATER TRANS-PORTATION	OTHER TRANS-PORTATION
1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	157.
2	6.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	34.
3	6210.	0.	0.	0.	0.	30.	0.	0.	0.	0.	78.	0.	0.
4	5958.	0.	0.	0.	0.	408.	0.	0.	0.	0.	997.	0.	279.
5	16.	0.	539.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
6	0.	0.	4129.	0.	0.	104.	0.	0.	0.	0.	3.	0.	0.
7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8	0.	0.	0.	0.	0.	273.	10371.	0.	0.	0.	0.	0.	101.
9	7.	0.	7.	914.	0.	445.	106.	1676.	1.	0.	82.	0.	0.
10	201.	90.	294.	2739.	88.	1904.	721.	323.	52.	282.	821.	1001.	4741.
11	5364.	0.	1.	1018.	0.	3027.	52.	11.	1.	0.	105.	51.	612.
12	61.	12.	72.	470.	20.	100.	4.	20.	13.	0.	567.	190.	195.
13	75.	25.	14844.	20995.	5.	331.	3.	147.	52.	792.	1485.	0.	9.
14	576.	641.	362.	82844.	3174.	6023.	263.	985.	144.	194.	1722.	167.	198.
15	197.	14.	7.	1454.	1290.	111.	3.	5.	36.	5.	52.	24.	84.
16	699.	1790.	801.	15428.	410.	57923.	1074.	770.	172.	417.	8601.	220.	197.
17	150.	54.	341.	2189.	32.	8465.	2531.	205.	32.	175.	347.	1077.	5891.
18	517.	2.	278.	310.	0.	1129.	65.	2001.	51.	502.	649.	63.	65.
19	394.	27.	158.	653.	39.	869.	31.	49.	145.	1044.	618.	67.	119.
20	3.	5.	45.	0.	1.	109.	5.	36.	105.	21137.	992.	1659.	1523.
21	142.	3027.	170.	2128.	87.	1673.	47.	267.	980.	2878.	7680.	443.	254.
22	105.	14.	721.	1090.	3.	663.	696.	147.	12.	40.	364.	14270.	122.
23	726.	484.	1277.	12992.	268.	5668.	1601.	1587.	227.	1486.	3327.	6220.	4912.
24	508.	597.	634.	7823.	375.	6205.	830.	1205.	194.	791.	2801.	944.	2066.
25	1475.	1946.	2077.	11604.	544.	7198.	521.	891.	375.	2427.	5634.	1405.	5451.
26	463.	1089.	734.	6409.	977.	7710.	1497.	791.	234.	965.	2396.	3499.	4961.
27	128.	36.	1.	012.	39.	643.	28.	27.	27.	114.	120.	149.	150.
28	28.	35.	17.	170.	38.	255.	10.	24.	8.	41.	99.	68.	95.
29	1465.	909.	842.	7031.	706.	15359.	1108.	765.	252.	2194.	3409.	1929.	4001.
30	554.	800.	1204.	3810.	206.	2359.	430.	332.	174.	3250.	1291.	4580.	4110.
300. TOTAL	25903.	21430.	29873.	103699.	8377.	129142.	29967.	14274.	3347.	39457.	44149.	30350.	41415.
31	971.	1624.	2033.	11531.	852.	4532.	825.	1574.	531.	5681.	4501.	2841.	2550.
32	9066.	18662.	9742.	54101.	4862.	54297.	5559.	12200.	5020.	34297.	60001.	26623.	41124.
33	1472.	4611.	16552.	106503.	5289.	49029.	6949.	5372.	1194.	6465.	32859.	52925.	21209.
TOTAL	37412.	46327.	50000.	359374.	19400.	237000.	43300.	31300.	11000.	85900.	141500.	110439.	106290.

TABLE 1 (Continued)

SECTOR	TOTAL INTER-MEDIATE DEMAND										FINAL DEMAND		TOTAL OUTPUT	
	42	43	44	45	46	47	48	49	50	FEDERAL GOVERNMENT	HOUSEHOLDS	EXPORTS		
1	0.	0.	0.	0.	0.	0.	0.	0.	66.	13998.	0.	1794.	1936.	17726.
2	0.	27.	1.	0.	0.	0.	46.	0.	929.	1343.	0.	618.	28927.	30883.
3	0.	0.	1044.	0.	0.	0.	21.	41.	44.	10174.	892.	2129.	2717.	15912.
4	0.	0.	2251.	0.	0.	0.	0.	320.	27.	16994.	415.	2351.	3055.	22005.
5	0.	27.	100.	19.	0.	0.	0.	10.	270.	2127.	0.	1047.	3770.	6944.
6	0.	0.	5.	0.	0.	0.	0.	6.	18.	4386.	437.	0.	14.	4837.
7	0.	204.	307.	0.	0.	0.	0.	36.	153.	2652.	28.	324.	26.	3030.
8	6332.	0.	347.	0.	0.	0.	0.	0.	0.	26003.	0.	0.	0.	26000.
9	0.	13.	82.	0.	0.	0.	0.	0.	0.	6215.	0.	9.	4292.	10516.
10	4844.	1531.	17782.	560.	0.	0.	2121.	937.	83170.	122260.	350.	115667.	62109.	304386.
11	2.	1954.	410.	4.	0.	0.	284.	0.	284.	19034.	22.	12793.	5563.	37412.
12	42.	538.	89.	401.	0.	0.	136.	29.	219.	13607.	37.	23235.	9448.	46327.
13	2.	394.	97.	23.	0.	0.	0.	0.	16.	55610.	0.	616.	2574.	58000.
14	123.	3498.	625.	305.	0.	0.	296.	199.	2608.	107547.	241.	2892.	245694.	356374.
15	65.	541.	486.	17.	0.	0.	831.	8970.	852.	15273.	40.	2937.	1142.	19400.
16	125.	1625.	901.	1076.	0.	0.	2739.	659.	7502.	110056.	143.	14508.	113093.	237000.
17	1004.	2666.	1341.	441.	0.	0.	407.	496.	835.	37140.	93.	5888.	179.	43300.
18	1.	465.	91.	102.	0.	0.	26.	401.	225.	19953.	2.	973.	10312.	31300.
19	11.	197.	34.	77.	0.	0.	6.	500.	25.	10496.	2.	589.	13.	11000.
20	11.	797.	377.	36.	0.	0.	4.	2608.	1357.	34208.	35.	2931.	49646.	85900.
21	91.	866.	276.	629.	0.	0.	433.	1010.	1803.	30797.	18.	36241.	74444.	141500.
22	142.	50.	110.	20.	0.	0.	19.	39.	97.	19009.	339.	1386.	96305.	118439.
23	1644.	3393.	2613.	350.	0.	0.	547.	1081.	3565.	62881.	5210.	4750.	20497.	106298.
24	19847.	10957.	4614.	1320.	0.	0.	5512.	9073.	12875.	93037.	649.	45670.	17345.	154701.
25	1190.	8570.	4927.	1526.	0.	0.	2431.	5556.	2622.	49440.	154.	214002.	105142.	419738.
26	2600.	79387.	38759.	4091.	0.	0.	7255.	7253.	8914.	140405.	869.	156946.	59502.	357722.
27	812.	1201.	404.	1578.	0.	0.	739.	694.	480.	8787.	14.	24122.	14087.	47010.
28	91.	521.	1205.	147.	0.	0.	1085.	262.	10730.	15800.	2.	80119.	33304.	129225.
29	4364.	21493.	13210.	1046.	0.	0.	3394.	9001.	5317.	113638.	699.	30760.	1128.	148225.
30	12397.	84795.	40507.	1285.	0.	0.	3534.	4052.	365.	189359.	9.	21438.	56427.	267244.
FRD. TOT.	55747.	173087.	142277.	15061.	33250.	53105.	144891.	1408740.						
31	29389.	4379.	12706.	604.	1880.	2156.	1379.				18013.	63913.	0.	204009.
32	55386.	213697.	55281.	25611.	87942.	77450.	113976.				51441.	0.	165527.	1318256.
33	14179.	29575.	147658.	4854.	6153.	15514.	6977.				2470.	175541.	0.	812544.
TOTAL	154701.	419730.	357722.	47010.	123225.	148225.	267244.				83432.	1054589.	1196760.	5595549.

representation of the economy as it appeared for one year. Because of the time lags of statistical reporting, the actual base year may be as much as five to ten years in the past. In order to have a more flexible picture of the internal structure of the economy which might be expected to hold true for a longer period of time (or at least until new data become available for analysis), the transactions data are converted from actual dollar values to proportions of the total. This is accomplished by dividing each entry in a column by the row total. The result is a production "recipe" for each sector; the proportion of each input that it takes to make one dollar's worth of whatever that sector produces. This is illustrated for the study region in Table 2, the Direct Requirements Table. Reading down the third column, in order to produce each dollar of its product the Livestock sector needs 11.29 cents of production from itself, 28.56 cents from Crops, 1.4 cents from Agricultural, Forestry and Fishery Services, etc. Note that the production recipe applies only to columns and not to rows; that is, only columns add up to unity. This is because the economic structure of the region is expressed in terms of production, not consumption.

Direct and Indirect Requirements Table

The final table of interest in an input-output study is that of the Direct and Indirect Requirements (Table 3). This table is derived by calculating the total effect on the entire economy of additional sales to final demand by each sector [30]. The distinction between this table and Table 2 is that the Direct Requirements Table shows the direct (or "first round") purchases which a sector needs to make in order to increase its output, while the Direct and Indirect Requirements Table traces not only the direct purchases but also the indirect purchases which the increased sales to final demand by one industry stimulates in all industries

TABLE 3
DIRECT & INDIRECT REQUIREMENTS TABLE
ALABAMA COASTAL REGION

SECTOR	1	2	3	4	5	6	7	8	9	10
1 FISHERY PRODUCTS	1-00028	0-45053	0-00047	0-00036	0-00028	0-00039	0-00021	0-00013	0-00012	0-00016
2 FRESH/FROZEN PK FISH	0-00049	1-00995	0-00075	0-00059	0-00049	0-00052	0-00033	0-00022	0-00019	0-00020
3 LIVESTOCK	0-00556	0-01734	1-16044	0-02980	0-03493	0-03949	0-03835	0-00092	0-00058	0-00084
4 CROPS	0-00759	0-02129	0-38335	1-06517	1-01428	0-15381	0-23154	0-00200	0-00131	0-00238
5 GREENHOUSE & NURSERY	0-00042	0-00055	0-00284	0-00652	0-07653	0-07091	0-00770	0-00026	0-00019	0-00198
6 FORESTRY PRODUCTS	0-00059	0-00091	0-00040	0-00096	0-00043	1-02743	0-00091	0-00036	0-00034	0-00543
7 AG, FOR, FISH SERVICES	0-00078	0-00155	0-01444	0-04964	0-00963	0-05170	1-01143	0-00042	0-00025	0-00193
8 PETROLEUM & NAT. GAS	0-04606	0-02528	0-01625	0-02523	0-00836	0-01152	0-00805	1-02663	0-01692	0-01245
9 SAND & GRAVEL MINING	0-00119	0-00139	0-00371	0-00742	0-00272	0-00183	0-00210	0-00101	1-02910	0-01130
10 CONSTRUCTION	0-05638	0-06179	0-08802	0-07450	0-05824	0-05560	0-03880	0-05887	0-03388	1-02362
11 FIBER & KINDED EXCL 2	0-02547	0-08725	0-16141	0-00444	0-00643	0-00783	0-02098	0-00105	0-00131	0-00171
12 APPAREL & TEXTILES	0-02744	0-01424	0-00213	0-00325	0-00121	0-00131	0-00273	0-00039	0-00607	0-00145
13 LUMBER & WOOD PROD.	0-00785	0-01226	0-01048	0-01220	0-00553	0-00607	0-01225	0-00484	0-00443	0-07510
14 PAPER & ALLIED PROD.	0-00869	0-07416	0-01552	0-01482	0-00811	0-00894	0-05718	0-00372	0-01730	0-01143
15 PRINTING & PUBLISH.	0-00350	0-00513	0-00687	0-00772	0-00480	0-00316	0-00307	0-00287	0-00400	0-00505
16 CHEM, PLAS, DRUG, PAINT	0-02504	0-02959	0-07352	0-14925	0-04271	0-03330	0-04806	0-01883	0-03556	0-02809
17 PETROLEUM REFINING	0-10144	0-00567	0-03247	0-05282	0-01588	0-02389	0-01629	0-00620	0-03361	0-02612
18 STONE, CLAY & GLASS	0-00517	0-00844	0-00482	0-00322	0-00422	0-00407	0-00229	0-00713	0-00231	0-04673
19 FAURICATED METALS	0-00711	0-00844	0-00482	0-00322	0-00230	0-01642	0-00229	0-00250	0-00231	0-01822
20 TRANSPORT- EQUIPMENT	0-18029	0-08410	0-00553	0-00374	0-00330	0-00558	0-00291	0-00212	0-00247	0-00380
21 OTHER MANUFACTURING	0-04494	0-02582	0-00701	0-00773	0-00822	0-01188	0-00714	0-00681	0-01470	0-01930
22 WATER TRANSPORTATION	0-00312	0-01323	0-00490	0-00529	0-00332	0-07448	0-00231	0-00834	0-00623	0-00372
23 OTHER TRANSPORTATION	0-01740	0-06735	0-05690	0-03826	0-02131	0-00265	0-02505	0-01155	0-01713	0-03901
24 COMMUNICATION & UTIL	0-04437	0-04255	0-04545	0-04605	0-03219	0-02334	0-01959	0-02539	0-05281	0-02415
25 WHOLE & RETAIL TRADE	0-07224	0-09128	0-10655	0-09028	0-06564	0-03808	0-03965	0-02503	0-03515	0-10455
26 FIN, INS, & REAL EST	0-14495	0-09835	0-11898	0-16935	0-05454	0-06013	0-07665	0-18588	0-07227	0-03979
27 HOTEL, PERS, REPR SERV	0-00193	0-00217	0-00297	0-00242	0-00135	0-00132	0-00121	0-00112	0-00123	0-00132
28 MED, EDUC, & NONPROF	0-00651	0-00532	0-01673	0-00878	0-00664	0-00659	0-00467	0-00367	0-00277	0-00351
29 OTHER SERVICES	0-03339	0-05206	0-06601	0-09269	0-05807	0-03285	0-03064	0-03247	0-05301	0-06788
30 STATE & LOCAL GOV'T	0-13403	0-10399	0-19849	0-16155	0-13620	0-13807	0-09055	0-06025	0-05088	0-04968
TOTALS	2-01420	2-46716	2-64370	2-15027	1-68774	1-99316	1-80561	1-50099	1-53367	1-63091

TABLE 3
DIRECT & INDIRECT REQUIREMENTS TABLE
ALABAMA COASTAL REGION

	11	12	13	14	15	16	17	18	19	20	21	22	23
1	0.00017	0.00013	0.00020	0.00019	0.00013	0.00017	0.00019	0.00019	0.00013	0.00019	0.00011	0.00023	0.00186
2	0.00081	0.00019	0.00026	0.00020	0.00017	0.00020	0.00023	0.00017	0.00016	0.00019	0.00015	0.00032	0.00062
3	0.23273	0.00080	0.00460	0.00257	0.00101	0.00586	0.00122	0.00076	0.00061	0.00050	0.00178	0.00053	0.00218
4	0.27336	0.00223	0.01560	0.00447	0.00202	0.00871	0.00230	0.00164	0.00185	0.00145	0.00983	0.00110	0.00592
5	0.00252	0.00022	0.02002	0.00171	0.00044	0.00037	0.00027	0.00031	0.00027	0.00043	0.00043	0.00018	0.00033
6	0.00093	0.00055	0.00680	0.00772	0.00156	0.00131	0.00046	0.00100	0.00088	0.00143	0.00144	0.00026	0.00054
7	0.01613	0.00029	0.00518	0.00074	0.00036	0.00073	0.00042	0.00028	0.00026	0.00029	0.00067	0.00022	0.00061
8	0.01387	0.00531	0.00847	0.01039	0.00612	0.02891	0.46694	0.01038	0.00525	0.00475	0.00645	0.00792	0.03225
9	0.00380	0.00071	0.00125	0.00427	0.00116	0.00379	0.00378	0.05959	0.00093	0.00100	0.00158	0.00055	0.00126
10	0.05990	0.02582	0.03519	0.03407	0.02945	0.03832	0.06127	0.03463	0.02423	0.03321	0.02467	0.03580	0.08247
11	1.20166	0.00230	0.00225	0.01040	0.00301	0.02177	0.00335	0.00243	0.00158	0.00120	0.00338	0.00151	0.00852
12	0.00395	1.24344	0.00268	0.00299	0.00227	0.00202	0.00075	0.00218	0.00260	0.01590	0.00300	0.00291	0.00320
13	0.01234	0.00701	1.34201	0.10643	0.02131	0.00974	0.00598	0.01356	0.01189	0.01958	0.01904	0.00346	0.00730
14	0.03561	0.02984	0.01589	1.31140	0.23366	0.04986	0.01373	0.04929	0.02355	0.00952	0.02312	0.00512	0.00808
15	0.01399	0.00410	0.00327	0.00958	1.07719	0.00880	0.00454	0.00402	0.00675	0.00400	0.00395	0.00277	0.00572
16	0.07036	0.07870	0.03635	0.08410	0.04917	1.33513	0.04787	0.04515	0.03469	0.02018	0.09235	0.00882	0.01367
17	0.02666	0.00849	0.01623	0.01866	0.00948	0.05686	1.07124	0.01737	0.00855	0.00794	0.01078	0.01596	0.06696
18	0.02200	0.00263	0.00913	0.00456	0.00244	0.00986	0.00715	1.07277	0.00733	0.01072	0.00741	0.00281	0.00541
19	0.01510	0.00237	0.00622	0.00430	0.00383	0.00669	0.00302	0.00313	1.01315	0.01762	0.00604	0.00188	0.00368
20	0.00529	0.00347	0.00455	0.00340	0.00304	0.00521	0.00382	0.00478	0.02560	1.32979	0.01233	0.02349	0.02297
21	0.01139	0.11127	0.00824	0.01203	0.00911	0.01398	0.00652	0.01338	0.09844	0.05230	1.06120	0.00746	0.00725
22	0.00650	0.00164	0.02648	0.00769	0.00206	0.00638	0.02381	0.00729	0.00239	0.00178	0.00436	1.13779	0.00342
23	0.04943	0.02373	0.04513	0.06105	0.03107	0.04467	0.05227	0.06601	0.03069	0.03189	0.03447	0.04769	1.05932
24	0.04986	0.03494	0.03105	0.04997	0.04392	0.06092	0.04533	0.06396	0.0426	0.02900	0.03803	0.02114	0.04949
25	0.09693	0.06936	0.06196	0.06268	0.05122	0.06002	0.03588	0.04791	0.04999	0.05240	0.05676	0.02468	0.07236
26	0.00873	0.05258	0.04105	0.05025	0.08378	0.07717	0.13749	0.05317	0.04098	0.03383	0.03934	0.05076	0.08079
27	0.00632	0.00236	0.00114	0.00449	0.00408	0.00549	0.00217	0.00233	0.00368	0.00291	0.00223	0.00228	0.00294
28	0.00001	0.00368	0.00368	0.00327	0.00475	0.00536	0.00366	0.00314	0.00294	0.00412	0.00280	0.00363	0.00484
29	0.09258	0.04645	0.03020	0.05020	0.06771	0.11131	0.05606	0.04826	0.04104	0.05093	0.04590	0.03155	0.06338
30	0.11112	0.05135	0.06770	0.04008	0.04502	0.05106	0.05840	0.04210	0.04088	0.07372	0.03676	0.06286	0.07783
	2.53211	1.01598	1.95077	1.97266	1.79056	2.02864	2.12097	1.67119	1.51552	1.81284	1.55238	1.50566	1.69520

TABLE 3
DIRECT & INDIRECT REQUIREMENTS TABLE
ALABAMA COASTAL REGION

	24	25	26	27	28	29	30
1	0.00023	0.00069	0.00035	0.00014	0.00028	0.00014	0.00194
2	0.00039	0.00090	0.00062	0.00023	0.00056	0.00023	0.00367
3	0.00040	0.00187	0.00482	0.00084	0.00298	0.00097	0.00137
4	0.00009	0.00303	0.01025	0.00193	0.00454	0.00379	0.00255
5	0.00030	0.00060	0.00084	0.00069	0.00022	0.00030	0.00105
6	0.00045	0.00070	0.00073	0.00041	0.00031	0.00036	0.00199
7	0.00030	0.00106	0.00185	0.00035	0.00045	0.00065	0.00139
8	0.05403	0.00013	0.00730	0.00900	0.00614	0.00737	0.01025
9	0.00094	0.00125	0.00171	0.00083	0.00066	0.00074	0.00394
10	0.07610	0.08606	0.11435	0.04175	0.04123	0.03540	0.33317
11	0.00082	0.00712	0.00325	0.00165	0.01259	0.00118	0.00379
12	0.00085	0.00237	0.00099	0.01149	0.00178	0.00111	0.00200
13	0.00608	0.00929	0.00964	0.00535	0.00397	0.00482	0.02626
14	0.00514	0.01836	0.00876	0.01418	0.00866	0.02021	0.02078
15	0.00425	0.00773	0.00721	0.00513	0.01036	0.01104	0.00790
16	0.00989	0.02042	0.01707	0.04062	0.03489	0.01580	0.05173
17	0.01230	0.01307	0.01067	0.01561	0.00796	0.00830	0.01619
18	0.00400	0.00597	0.00613	0.00507	0.00281	0.00531	0.01673
19	0.00181	0.00266	0.00261	0.00309	0.00134	0.00503	0.00662
20	0.00260	0.00673	0.00564	0.00383	0.00200	0.02471	0.00985
21	0.00401	0.00724	0.00548	0.01847	0.00606	0.01166	0.01529
22	0.00225	0.00119	0.00134	0.00146	0.00098	0.00108	0.00229
23	0.01951	0.01969	0.01831	0.01608	0.01100	0.01625	0.03177
24	1.16147	0.05534	0.05592	0.04890	0.06100	0.08743	0.07344
25	0.02304	1.04056	0.03528	0.04831	0.03118	0.05369	0.05231
26	0.04436	0.09533	1.14301	0.11862	0.07812	0.07773	0.06205
27	0.00708	0.00594	0.00417	1.03616	0.00717	0.00659	0.00356
28	0.00557	0.01156	0.01150	0.00664	1.01443	0.00517	0.04310
29	0.04816	0.07736	0.06204	0.06159	0.04324	1.08546	0.05557
30	0.10931	0.23458	0.17259	0.06335	0.05399	0.06200	1.03810
	1.60663	1.74561	1.70527	1.58169	1.45079	1.61415	1.90154

(the second, third, and successive rounds, or "feedback" effects). The Direct and Indirect Requirements Table relates final demand to total outputs, and the Direct Requirements Table relates total output to input requirements. Used together, the changes in output necessary to support a change in final demand and the changes in inputs required for new outputs may be examined.

The entire production system is described as responsive to demand, which is consistent with the traditional view that demands come from outside of the production system (i.e., they are exogenous). For example, while the Fishery Products sector buys goods or services directly from only seventeen sectors (Table 2), it could indirectly stimulate the output of all sectors of the economy, as evidenced by non-zero entries in all cells in the Fishery Products column of Table 3. This is the result of the interdependence of sectors in the economy; the Fishery Products sector buys goods from the Transportation Equipment sector which buys from Lumber & Wood, which buys from Forestry and so on ad infinitum.

The total at the bottom of each column in Table 3 is known as the "output multiplier" for that sector and indicates the total amount of production necessary to sustain a one dollar increase in final demand by that sector. Thus, an increase of one dollar in final demand for Fishery Products requires one dollar of direct output plus \$1.01 of indirect output.

An example may help to demonstrate the usefulness of Tables 2 and 3. Suppose that the Fresh or Frozen Packaged Fish sector is expecting an increase in exports of its product of \$850,000. This constitutes an increase in sales entirely to final demand. From our knowledge of the interdependence of sectors in the economy we know that it will take more than \$850,000 of output from the entire economy to support this increase

in sales to final demand, but we want to know, "just how much more from each sector?" From Table 3, the column sum of sector 2, Fresh or Frozen Packaged Fish, is 2.46716. This means that for every dollar of increased sales to final demand, \$2.47 of increased output is required from the economy as a whole. Therefore, for an \$850,000 increase the economy must produce \$2,097,086 ($\$850,000 \times 2.46716$) in output. A breakdown of this shows that \$382,951 ($\$850,000 \times 0.45053$) must come from Fishery Products; \$858,458 ($\$850,000 \times 1.00995$) must come from Fresh or Frozen Packaged Fish itself; \$14,739 ($\$850,000 \times 0.01734$) from Livestock and so on down the column of sector 2 for a total of \$2,097,086.

Now that we know how much increased output we need from each sector, we can determine how much input each sector needs from Table 2. Since Fishery Products must increase output by \$382,951 it must purchase \$7,582 ($\$382,951 \times 0.01980$) from Food and Kindred Products (probably in the form of ice), \$34,282 ($\$382,951 \times 0.08952$) from Petroleum Refining (probably as diesel fuel) and so on. Fresh and Frozen Packaged Fish increases purchases in the same to meet increased output requirement, but it must produce much more than any other sector because it has \$850,000 in direct output requirement as well as \$8,458 ($1.00995 - 1.00000 \times \$850,000$) additional output indirectly related to its original sales to final demand. Referring to Table 2 we see that 65% of the increased requirement for inputs is supplied by two sectors: \$382,846 ($\$858,458 \times 0.44597$) from Fishery Products, and \$177,263 ($\$858,458 \times 0.20649$) from Households.

A good example of interdependence is the fact that the Livestock sector sells nothing to the Fresh or Frozen Packaged Fish sector, yet its output will increase by \$14,739 when processed fish are exported. The sectors to which increased output from Livestock will be sold can be determined by taking the output required from each of the 30 sectors

and translating these into their direct purchases from Livestock. By doing this we find that almost all of the increased output from Livestock, or \$12,326 ($\$850 \times 0.08725 \times 0.16620$), would be sold to the Food and Kindred Products sector.

If the income and consumption effects that households have on the economy are taken into account, then the impact of a change in final demand is greatly increased. To determine the effects of household income and spending, the Households sector is included in the direct requirements matrix as a special kind of producing sector and a new matrix is calculated by the same procedure used in generating Table 3, [30]. The result is shown in Table 4; the Direct, Indirect and Induced Requirements Table. The contribution to interdependence that households have as they receive salaries and spend their income on goods produced in the region is called the "induced" effect and is measured by subtracting any cell in Table 3 from the corresponding cell in Table 4.

It is important to note that when dealing with indirect effects a distinction must be made between an increase in output and an increase in sales to final demand. The direct requirements of a sector are the same regardless of whether its sales are within the economy (endogenous) or outside the economy (exogenous). However, the indirect requirements are affected only by changes in sales outside of the economy, that is, to final demand or exogenous sectors (Federal Government, Households, or Exports) since without an outside influence there would be no stimulus to cause the system to change. It is important to identify the proportion of a total gross output change that is attributable to final demand changes as opposed to local (endogenous) sales when doing multiplier analysis [24].

TABLE 4
DIRECT, INDIRECT, & INDUCED REQUIREMENTS TABLE
ALABAMA COASTAL REGION

SECTOR	1	2	3	4	5	6	7	8	9	10
1 FISHERY PRODUCTS	1.00359	0.45372	0.00371	0.00342	0.00344	0.00306	0.00320	0.00213	0.00233	0.00251
2 FRESH/FROZEN PK FISH	0.00206	1.01147	0.00229	0.00204	0.00199	0.00217	0.00176	0.00117	0.00124	0.00131
3 LIVESTOCK	0.01590	0.02729	1.17054	0.03933	0.04478	0.05029	0.04769	0.00717	0.00748	0.00816
4 CROPS	0.02259	0.03572	0.39001	1.07900	0.02857	0.16949	0.24509	0.01107	0.01132	0.01301
5 GREENHOUSE & NURSERY	0.00227	0.00300	0.00245	0.00887	1.07896	0.07357	0.01000	0.00180	0.00189	0.00379
6 FORESTRY PRODUCTS	0.00307	0.00253	0.00253	0.00251	0.00203	1.02919	0.00243	0.00130	0.00146	0.00663
7 AG. FOR. FISH SERVICES	0.00306	0.00376	0.03669	0.05176	0.01182	0.05410	1.01350	0.00181	0.00179	0.00356
8 PETROLEUM & NAT. GAS	0.00454	0.00462	0.03286	0.04090	0.02456	0.02930	0.02340	1.03691	0.02827	0.02450
9 SAND & GRAVEL MINING	0.00200	0.29813	0.32790	0.30497	0.29229	0.31216	0.26064	0.20739	0.03194	0.01367
10 CONSTRUCTION	0.05334	0.11407	0.18063	0.03413	0.03299	0.03696	0.04615	0.01790	0.01991	0.02145
11 FOOD & KINDRED EXCL.2	0.07036	0.05554	0.04406	0.04282	0.04211	0.04618	0.04150	0.02634	0.03471	0.03187
12 APPAREL & TEXTILES	0.03056	0.03411	0.03266	0.03314	0.02716	0.02981	0.03275	0.01057	0.01959	0.09119
13 LUMBER & WOOD PROD.	0.03187	0.09647	0.03017	0.03620	0.03020	0.03317	0.07812	0.01773	0.03277	0.02785
14 PAPER & ALLIED PROD.	0.01855	0.01961	0.02157	0.02160	0.01914	0.01889	0.01666	0.01197	0.01404	0.01571
15 PRINTING & PUBLISH.	0.08538	0.08754	0.13226	0.20488	0.10021	0.09638	0.10255	0.05531	0.07583	0.07085
16 CHEM. PLAS. DRUG. PAINT	0.12796	0.07922	0.05837	0.07727	0.04114	0.05161	0.04024	0.02223	0.05131	0.04491
17 PETROLEUM REFINING	0.02014	0.02008	0.02271	0.02000	0.01848	0.01972	0.01651	0.01610	0.04695	0.05734
18 STONE, CLAY & GLASS	0.01408	0.01515	0.01143	0.00964	0.00894	0.02370	0.00858	0.00672	0.00696	0.02316
19 FABRICATED METALS	0.19344	0.09674	0.01837	0.01786	0.01590	0.01932	0.01478	0.01007	0.01125	0.01112
20 TRANSPORT. EQUIPMENT	0.11258	0.09090	0.07309	0.07009	0.07267	0.08259	0.06823	0.04771	0.05985	0.06723
21 OTHER MANUFACTURING	0.00788	0.01782	0.00955	0.00968	0.00786	0.07946	0.00661	0.01122	0.00941	0.00709
22 WATER TRANSPORTATION	0.05863	0.10702	0.09717	0.07627	0.06060	0.12575	0.06229	0.03648	0.04465	0.06823
23 OTHER TRANSPORTATION	0.16556	0.15916	0.16383	0.15778	0.14766	0.15002	0.12904	0.09867	0.13369	0.11003
24 COMMUNICATION & UTIL	0.43105	0.43654	0.45709	0.42111	0.40755	0.41316	0.36371	0.24198	0.27465	0.35881
25 WHLSL & RETAIL TRADE	0.46316	0.40455	0.42986	0.46275	0.45777	0.39278	0.36405	0.37829	0.28467	0.26528
26 FIN. INS. & REAL EST	0.04167	0.04041	0.04179	0.03906	0.03922	0.04286	0.03710	0.02515	0.02775	0.02949
27 HOTEL, PERSERPR SERV	0.12957	0.12373	0.13645	0.12224	0.12391	0.13523	0.11581	0.07808	0.08492	0.09072
28 HLD. EDUC. & NONPROF	0.15008	0.16435	0.18001	0.20028	0.16927	0.15483	0.13603	0.10303	0.13090	0.15057
29 OTHER SERVICES	0.30991	0.27322	0.37032	0.32371	0.30379	0.32193	0.24939	0.16659	0.16028	0.17431
30 STATE & LOCAL GOV'T	1.47453	1.43085	1.44051	1.35952	1.40507	1.54139	1.33173	0.89157	0.98421	1.04487
31 HOUSEHOLDS										
TOTALS	5.51233	5.73697	5.96344	5.28335	4.92601	5.54538	4.87467	3.55567	3.80185	4.03887

TABLE 4
DIRECT, INDIRECT, & INDUCED REQUIREMENTS TABLE
ALABAMA COASTAL REGION

	11	12	13	14	15	16	17	18	19	20	21	22	23
1	0.00355	0.00324	0.00217	0.00200	0.00221	0.00255	0.00226	0.00291	0.00330	0.00334	0.00283	0.00193	0.00461
2	0.00212	0.00167	0.00120	0.00106	0.00116	0.00134	0.00121	0.00147	0.00167	0.00177	0.00143	0.00113	0.00193
3	0.24263	0.01048	0.01075	0.00823	0.00749	0.01230	0.00765	0.00927	0.01050	0.01034	0.01022	0.00583	0.01075
4	0.28771	0.01628	0.02454	0.01268	0.01143	0.01950	0.01171	0.01398	0.01619	0.01572	0.02209	0.00880	0.01836
5	0.00496	0.00261	0.02154	0.00310	0.00204	0.00220	0.00185	0.00241	0.00271	0.00285	0.00251	0.00148	0.00244
6	0.00254	0.00212	0.09780	0.00864	0.00262	0.00252	0.00151	0.00239	0.00249	0.00303	0.00282	0.00112	0.00191
7	0.01833	0.00245	0.00654	0.00200	0.00180	0.00238	0.00184	0.00217	0.00246	0.00248	0.00254	0.00140	0.00251
8	0.03016	0.02124	0.01860	0.01969	0.01678	0.04113	0.04751	0.02437	0.02151	0.02093	0.02034	0.01664	0.04634
9	0.00701	0.00304	0.00324	0.00610	0.00326	0.00619	0.00584	0.06234	0.00414	0.00419	0.00432	0.00227	0.00404
10	0.29520	0.25595	0.18150	0.16921	0.18347	0.21490	0.21404	0.23669	0.25914	0.26692	0.22530	0.16182	0.28609
11	1.22835	0.02841	0.01885	0.02564	0.02049	0.04180	0.02068	0.02536	0.02423	0.02772	0.02615	0.01581	0.03162
12	0.04507	1.28865	0.02824	0.02646	0.02019	0.03287	0.02744	0.03749	0.04364	0.05674	0.04006	0.02493	0.03878
13	0.03609	0.02828	1.35553	0.11845	0.03555	0.02607	0.02011	0.03224	0.03361	0.04118	0.03758	0.01511	0.02612
14	0.05782	0.05156	0.02970	1.32408	0.24820	0.06652	0.02815	0.06836	0.04572	0.03158	0.04206	0.01701	0.02730
15	0.02840	0.01420	0.01224	0.01782	1.08663	0.01962	0.01390	0.01640	0.02114	0.01832	0.01624	0.01050	0.01819
16	0.12016	0.13524	0.07229	0.11710	0.08701	1.37850	0.08540	0.09479	0.09239	0.07759	0.14164	0.03977	0.06369
17	0.05205	0.03333	0.03202	0.03316	0.02611	0.07592	1.08773	0.03918	0.03390	0.03317	0.03243	0.02956	0.08894
18	0.03634	0.01666	0.01805	0.01275	0.01182	0.02062	0.01646	1.08508	0.02165	0.02496	0.01964	0.01049	0.01782
19	0.02178	0.00890	0.01037	0.00811	0.00820	0.01170	0.00735	0.00886	1.01981	0.02425	0.01173	0.00546	0.00946
20	0.01788	0.01579	0.01238	0.01059	0.01120	0.01466	0.01200	0.01559	0.03817	1.34229	0.02307	0.03024	0.03387
21	0.07619	0.17465	0.04853	0.04902	0.05153	0.06261	0.04859	0.06903	0.16313	0.11666	1.11645	0.04217	0.06332
22	0.01114	0.00610	0.02931	0.01029	0.00504	0.00980	0.02677	0.01121	0.00694	0.00632	0.00825	1.14023	0.00737
23	0.00893	0.06235	0.06969	0.08360	0.05692	0.07431	0.07791	0.09992	0.07012	0.07112	0.06815	0.06884	1.09350
24	0.16595	0.14040	0.10323	0.11625	0.11991	0.14804	0.12070	0.16366	0.15016	0.14431	0.13702	0.00332	0.14995
25	0.44066	0.40554	0.27568	0.25893	0.27623	0.31798	0.25905	0.34310	0.39316	0.39382	0.34985	0.20879	0.36982
26	0.39357	0.35073	0.23060	0.22430	0.28333	0.30594	0.33541	0.31496	0.34532	0.33662	0.29927	0.21403	0.34459
27	0.04439	0.03959	0.02481	0.02622	0.02900	0.03406	0.02688	0.03503	0.04169	0.04072	0.03469	0.02267	0.03589
28	0.12590	0.11898	0.07698	0.07058	0.08192	0.09283	0.08020	0.10438	0.12064	0.12122	0.10332	0.06678	0.10686
29	0.20436	0.15577	0.10770	0.11402	0.14009	0.19520	0.12944	0.14426	0.15265	0.16196	0.14122	0.09142	0.16011
30	0.27960	0.21614	0.17247	0.14627	0.15531	0.17751	0.16779	0.18679	0.20909	0.24107	0.18042	0.15311	0.22364
31	1.41253	1.38152	0.87829	0.80648	0.92465	1.06006	0.91712	1.21305	1.41024	1.40304	1.20442	0.75657	1.22237
	5.78738	6.99977	3.97485	3.81124	3.92146	4.47162	4.23453	4.46675	6.76550	5.04622	4.32804	1.24923	4.51222

TABLE 4
DIRECT, INDIRECT, & INDUCED REQUIREMENTS TABLE
ALABAMA COASTAL REGION

	24	25	26	27	28	29	30	31
1	0.00277	0.00393	0.00209	0.00343	0.00396	0.00340	0.00518	0.00441
2	0.00160	0.00254	0.00145	0.00180	0.00231	0.00178	0.00521	0.00210
3	0.00031	0.01259	0.01024	0.01110	0.01444	0.01114	0.01148	0.01374
4	0.01237	0.01859	0.01812	0.01671	0.02118	0.01854	0.01722	0.01994
5	0.00225	0.00324	0.00218	0.00322	0.00304	0.00281	0.00434	0.00339
6	0.00174	0.00244	0.00161	0.00208	0.00217	0.00202	0.00363	0.00224
7	0.00206	0.00344	0.00305	0.00263	0.00299	0.00291	0.00363	0.00305
8	0.00704	0.02576	0.01622	0.02587	0.02499	0.02409	0.02687	0.02260
9	0.00351	0.00472	0.00346	0.00516	0.00437	0.00404	0.00721	0.00445
10	0.26408	0.34077	0.24316	0.28539	0.31357	0.27694	0.57327	0.32653
11	0.02215	0.03602	0.01786	0.02930	0.04350	0.02859	0.03103	0.03705
12	0.03369	0.04687	0.02349	0.05406	0.04937	0.04332	0.04396	0.05706
13	0.02346	0.03283	0.02155	0.02787	0.02915	0.02715	0.04845	0.03019
14	0.02290	0.04240	0.02092	0.03717	0.03436	0.04301	0.04344	0.03082
15	0.01577	0.02333	0.01511	0.02005	0.02705	0.00584	0.02261	0.02001
16	0.05607	0.08299	0.04871	0.10047	0.10179	0.07513	0.11071	0.08021
17	0.03259	0.04056	0.02457	0.04191	0.03736	0.03437	0.04211	0.03525
18	0.01553	0.02150	0.01398	0.01992	0.01941	0.02003	0.03136	0.01990
19	0.00716	0.00989	0.00626	0.01000	0.00907	0.01188	0.01343	0.00927
20	0.01266	0.02037	0.01253	0.01687	0.01657	0.03764	0.02270	0.01748
21	0.05578	0.07739	0.04095	0.08554	0.08106	0.07798	0.08141	0.00992
22	0.00590	0.00613	0.00384	0.00618	0.00616	0.00576	0.00694	0.00633
23	0.05107	0.06245	0.03993	0.05697	0.05672	0.05680	0.07207	0.05481
24	1.25421	0.18100	0.09947	0.14911	0.19538	0.20660	0.19109	0.16111
25	0.29765	1.41265	0.22345	0.40423	0.42904	0.40655	0.40305	0.47702
26	0.28790	0.42532	1.31069	0.53428	0.43097	0.39066	0.37311	0.42305
27	0.03749	0.04615	0.02501	1.07558	0.05124	0.04567	0.04241	0.05283
28	0.09946	0.13917	0.07611	0.12071	1.15088	0.12619	0.16340	0.16360
29	0.13746	0.19037	0.12324	0.17734	0.17263	1.19921	0.16963	0.15513
30	0.24391	0.41697	0.26482	0.23781	0.24901	0.23575	1.21010	0.23382
31	1.12850	1.52907	0.77327	1.46266	1.63499	1.45003	1.44136	1.96028
	4.20732	5.26944	3.40732	4.95247	5.21072	4.55503	5.22324	4.51758

Multipliers

Three classes of multipliers; output, income, and employment, are generated in an input-output analysis. Each is further subdivided according to whether or not household income and expenditures are considered to be an integral part of the production system [30]. This consideration is referred to as the "type" or "degree of closure" of the model. The Type I model considers only the producing sectors and does not include households. The Type II model is usually "closed" with respect to households; that is, the influence of household incomes and expenditures is accounted for along with purchases and sales of producing sectors. Tables 5 and 6 list the Type I and Type II multipliers respectively for each sector.

Output multipliers are important to the analysis of the relationships between sectors in the economy in that they point out the degree of interdependence or structural interaction which each sector has with the rest of the economy, and its potential impact on the total economy. Sectors with large output multipliers such as Fresh or Frozen Packaged Fish are relatively more dependent on other sectors in the region, while those with small multipliers like Water Transportation may depend more on exogenous sectors such as Imports and Exports for their purchases and sales.

Income multipliers are measures of the change in total income in the region brought about by a change in income in any sector. For example, from Table 6 we see that a one dollar change in income for Fishery Products in the Type II model results in a \$3.54 change in total income in the region. Income multipliers are calculated by dividing total income effects by direct income effects. The total income effect depends on

TABLE 5
TYPE I MULTIPLIERS
ALABAMA COASTAL REGION

SECTOR	MULTIPLIERS		
	OUTPUT	INCOME	EMPL.
1 FISHERY PRODUCTS	2.01	1.80	1.37
2 FRESH/FROZEN PK FISH	2.47	1.51	3.25
3 LIVESTOCK	2.64	3.56	3.32
4 CROPS	2.15	2.18	1.60
5 GREENHOUSE & NURSERY	1.69	1.55	1.40
6 FORESTRY PRODUCTS	1.99	1.79	4.44
7 AG. FOR. FISH SERVICES	1.81	1.58	1.51
8 PETROLEUM & NAT. GAS	1.50	1.47	3.72
9 SAND & GRAVEL MINING	1.53	1.54	4.14
10 CONSTRUCTION	1.63	1.74	1.94
11 FOOD & KINDRED EXCL 2	2.53	2.97	2.28
12 APPAREL & TEXTILES	1.82	1.75	1.67
13 LUMBER & WOOD PROD.	1.95	2.70	1.90
14 PAPER & ALLIED PROD.	1.97	2.71	2.12
15 PRINTING & PUBLISH.	1.79	1.88	1.51
16 CHEM. PLAS. DRUG, PAINT	2.03	2.37	3.24
17 PETROLEUM REFINING	2.12	3.64	2.84
18 STONE, CLAY & GLASS	1.67	1.58	1.94
19 FABRICATED METALS	1.52	1.36	1.27
20 TRANSPORT. EQUIPMENT	1.81	1.79	1.87
21 OTHER MANUFACTURING	1.55	1.45	2.17
22 WATER TRANSPORTATION	1.51	1.72	1.66
23 OTHER TRANSPORTATION	1.70	1.61	1.68
24 COMMUNICATION & UTIL	1.61	1.61	1.90
25 WHLSL & RETAIL TRADE	1.75	1.53	1.45
26 FIN. INS. & REAL EST	1.71	2.55	2.71
27 HOTEL, PERS. SERV	1.58	1.37	1.27
28 HUD., EDUC. & NONPROF	1.45	1.21	1.22
29 OTHER SERVICES	1.61	1.42	1.56
30 STATE & LOCAL GOV'T	1.90	1.72	1.47
AVERAGE	1.83	1.99	2.15

TABLE 6
TYPE II MULTIPLIERS
ALABAMA COASTAL REGION

SECTOR	MULTIPLIERS		
	OUTPUT	INCOME	EMPL.
1 FISHERY PRODUCTS	5.41	3.54	2.23
2 FRESH/FROZEN PK FISH	5.74	6.87	5.41
3 LIVESTOCK	5.96	6.98	5.58
4 GROUPS	5.28	4.27	2.62
5 GREENHOUSE & NURSERY	4.93	3.04	2.36
6 FORESTRY PRODUCTS	5.55	3.50	10.57
7 AG. FOR. FISH SERVICES	4.87	3.11	2.47
8 PETROLEUM & NAT. GAS	3.56	2.89	12.72
9 SAND & GRAVEL MINING	3.80	3.02	14.77
10 CONSTRUCTION	4.04	3.42	4.12
11 FOOD & KINDRED EXCL2	5.79	5.83	3.67
12 APPAREL & TEXTILES	5.00	3.43	3.43
13 LUMBER & WOOD PROD.	3.97	5.30	3.12
14 PAPER & ALTED PROD.	3.83	5.30	4.19
15 PRINTING & PUBLIS.	3.92	3.69	2.50
16 CHEM. PLAS. DRUG, PAINT	4.47	4.64	7.76
17 PETROLEUM REFINING	4.23	7.14	6.97
18 STONE, CLAY & GLASS	4.47	3.09	5.06
19 FABRICATED METALS	4.77	2.66	2.44
20 TRANSPORT. EQUIPMENT	5.05	3.51	4.04
21 OTHER MANUFACTURING	4.33	2.84	6.41
22 WATER TRANSPORTATION	3.25	3.37	3.24
23 OTHER TRANSPORTATION	4.51	3.16	3.52
24 COMMUNICATION & UTIL	4.21	3.15	4.64
25 WHLSL & RETAIL TRADE	5.27	3.00	2.64
26 FIN, INS, & REAL EST	3.49	5.00	5.36
27 HOTEL, PERS, REPR SERV	4.95	2.68	2.30
28 MED, EDUC, & NONPROF	5.22	2.40	2.42
29 OTHER SERVICES	4.96	2.78	3.45
30 STATE & LOCAL GOV'T	5.22	3.38	2.72
AVERAGE	4.67	3.90	4.76

the type of model being used: Type I includes only direct and indirect effects; Type II includes direct, indirect and induced effects.

Employment multipliers represent the effect on total regional employment (in man-years) of changes in employment in any sector. Table 6 includes the Type II effect on total employment of a one man-year change in employment in each sector. Employment multipliers are also calculated as the ratio of total employment effect to direct employment effect.

Income and employment multipliers by themselves are of limited descriptive value. These multipliers can only be used in conjunction with changes in the direct effects of increases or decreases in sales to final demand. Sectors with large multipliers tend to have small changes in direct income or employment, and the opposite is true for sectors with small multipliers. So the product of the direct change and the multiplier, which equals the total change, serves to compensate for large differences in either of the components. For example, Fresh or Frozen Packaged Fish, which has a large income multiplier but a small direct income change, has about as much effect on the total income change in the economy as Fabricated Metals, which has a small income multiplier and a large direct income change. Therefore, the importance of each sector to the economy should be evaluated from the standpoint of its contribution to a total change in income or employment rather than the size of the multiplier. Another aspect of importance is the percentage change in sales to final demand which would be necessary to achieve a comparable increase in output among sectors. Obviously, it is most unlikely that Forestry Products could increase its sales to final demand by \$1 million (a change of 33%) in the same period of time that it might take the Construction sector (a change of 0.3%). It should also

be noted that in sectors where there is a high substitution rate of capital for labor, such as in the agriculture and mining sectors, employment effects of changes in final demand are probably overstated.

Tables 7 and 8 show the combined effects for each sector for income and employment given the same change in final demand: \$one million. Referring to these tables one can see that sectors that are labor-intensive (e.g., trade and services) tend to have high direct changes and low multipliers, while the reverse is true for capital-intensive sectors (e.g., agriculture and manufacturing).

The last column in Tables 7 and 8 shows the relative effect that a \$one million change in final demand would have on the output of that sector. An across-the-board dollar change in final demand rather than some percentage change was chosen for these examples based on the pattern of federal government expenditures to stimulate the economy of a region and to develop a rank order in terms of relative benefit to the region. However, a large injection of money into a relatively small sector would probably alter the direct requirements relationships as new technology is introduced and new markets develop. Thus the effect of a comparatively large change on a comparatively small sector would also require careful interpretation.

USE OF THE INPUT-OUTPUT MODEL

The results of the regional input-output model have been primarily descriptive up to this point: the transactions table describes the economy as it was in 1972; the direct requirements table describes the input requirements for each industry as they are thought to exist today; the tables of direct, indirect, and induced effects trace the output multiplier effects of changes in final demand; and the income and employment

TABLE 7

CHANGE IN HOUSEHOLD INCOME RESULTING FROM A \$ONE MILLION CHANGE
IN SALES TO FINAL DEMAND, BY SECTOR, ALABAMA COASTAL REGION

Sector	Direct change in income 1/ in income 1/	T I Income Multiplier	Direct and Indirect Change I/ Change I/	T II Income Multiplier	Direct, Indirect and Induced Change	Rank	% Change in Sales 3/
1. Fishery Products	416,910	1.40	750,438	1.40	1,475,861	4	5.6
2. Fresh or Frozen Packaged Fish	206,490	3.51	724,780	6.87	1,418,586	9	3.2
3. Livestock	206,450	3.56	734,962	6.98	1,441,021	8	6.3
4. Crops	318,090	2.18	693,436	4.27	1,358,244	15	4.4
5. Greenhouse and Nursery	462,850	1.55	717,418	3.04	1,407,064	12	14.4
6. Forestry Products	439,940	1.79	787,493	3.50	1,539,790	2	20.7
7. Agriculture, Forestry and Fishery Services	428,710	1.58	677,362	3.11	1,333,288	16	33.0
8. Petroleum and Natural Gas	308,770	1.47	453,892	2.89	892,345	26	3.8
9. Sand and Gravel Mining	325,410	1.54	501,131	3.02	982,738	23	9.5
10. Construction	305,480	1.74	531,535	3.42	1,044,742	22	0.3
11. Food and Kindred Products	242,330	2.97	719,720	5.83	1,412,784	10	2.7
12. Apparel and Textiles	402,830	1.75	704,953	3.43	1,381,707	14	2.2
13. Lumber and Wood Products	165,680	2.70	447,336	5.30	878,104	27	1.7
14. Paper and Allied Products	152,030	2.71	412,001	5.30	805,759	28	0.3
15. Printing and Publishing	250,620	1.88	471,166	3.69	924,788	24	5.2
16. Chemicals, Plastics, Drugs, Paints	228,330	2.37	541,142	4.64	1,059,451	21	0.4
17. Petroleum Refining	128,380	3.64	467,303	7.14	916,633	25	2.3
18. Stone, Clay and Glass Products	392,330	1.58	619,881	3.09	1,212,300	18	3.2
19. Fabricated Metals	529,820	1.36	720,555	2.66	1,409,321	11	9.1
20. Transportation Equipment	399,270	1.79	714,693	3.51	1,401,438	13	1.2
21. Other Manufacturing	424,040	1.45	614,858	2.84	1,204,274	19	0.7
22. Water Transportation	224,780	1.72	386,622	3.37	757,509	30	0.8
23. Other Transportation	306,870	1.61	622,861	3.16	1,222,509	17	0.9
24. Communication and Utilities	338,020	1.61	576,412	3.15	1,127,763	20	0.6
25. Wholesale and Retail Trade	509,120	1.53	778,954	3.00	1,527,360	3	0.2
26. Finance, Insurance, and Real Estate	154,540	2.55	394,077	5.00	772,700	29	0.3
27. Hotels, Personal and Repair Services	544,800	1.37	746,376	2.68	1,460,064	5	2.1
28. Medical, Educational, and non-Profit Services	680,530	1.23	837,052	2.40	1,613,272	1	0.8
29. Other Services	522,520	1.42	741,978	2.78	1,452,606	6	0.7
30. State and Local Government	426,560	1.72	733,683	3.38	1,461,773	7	0.4

1 Figures to the nearest whole number

2 Greatest increase has rank of 1. Based on T II multipliers.

3 Percentage change in total output brought about by a change in sales to final demand of \$1 million.

TABLE 8

CHANGE IN EMPLOYMENT RESULTING FROM A \$ONE MILLION CHANGE IN SALES TO FINAL DEMAND, BY SECTOR, ALABAMA COASTAL REGION

	Direct Change In Employment 1/	Type I Employment Multiplier	Direct and Indirect Change 1/	Type II Employment Multiplier	Direct, Indirect and Induced Change	Rank	% Change In Sales ³
1. Fishery Products	85	1.37	116	2.23	190	1	5.6
2. Fresh or Frozen Packaged Fish	32	3.25	104	5.41	173	3	3.2
3. Livestock	31	3.32	103	5.58	173	4	6.3
4. Crops	66	1.60	106	2.62	173	5	4.4
5. Greenhouse and Nursery	72	1.40	101	2.36	170	6	14.4
6. Forestry Products	12	4.44	53	10.57	127	16	20.7
7. Agriculture, Forestry and Fishery Services	68	1.51	103	2.47	168	7	33.0
8. Petroleum and Natural Gas	5	3.72	19	12.72	64	30	3.8
9. Sand and Gravel Mining	5	4.14	21	14.77	74	29	9.5
10. Construction	24	1.94	47	4.12	99	20	0.3
11. Food and Kindred Products	50	2.28	114	3.67	184	2	2.7
12. Apparel and Textiles	39	1.67	65	3.43	134	13	2.2
13. Lumber and Wood Products	36	1.90	68	3.12	112	19	1.7
14. Paper and Allied Products	21	2.32	49	4.19	88	25	0.3
15. Printing and Publishing	46	1.51	69	2.50	115	18	5.2
16. Chemicals, Plastics, Drugs, Paints	12	3.24	39	7.76	93	22	0.6
17. Petroleum Refining	11	2.84	31	6.97	77	27	2.3
18. Stone, Clay and Glass Products	19	1.94	37	5.06	96	21	3.2
19. Fabricated Metals	59	1.27	75	2.44	144	12	9.1
20. Transportation Equipment	32	1.87	60	4.04	129	15	1.2
21. Other Manufacturing	14	2.17	30	6.41	90	24	0.7
22. Water Transportation	24	1.66	40	3.24	78	26	0.8
23. Other Transportation and Utilities	33	1.68	55	3.52	116	17	0.9
24. Communications and Retail Trade	20	1.90	38	4.64	93	23	0.6
25. Finance, Insurance, and Real Estate	63	1.45	91	2.64	166	8	0.2
26. Hotels, Personal and Repair Service	14	2.71	38	5.36	75	28	0.3
27. Medical, Educational, and Non-Profit Services	70	1.27	89	2.30	161	10	2.1
28. Other Services	67	1.22	82	2.42	162	9	0.8
29. State and Local Government	38	1.56	59	3.45	131	14	0.7
30. Other Services	57	1.47	84	2.72	155	11	0.4

1 In man-years, rounded to nearest whole number

2 Greatest increase has rank of 1. Based on Type II multipliers.

3 Percentage change in total output brought about by a change in sales to final demand of \$1 million.

multipliers translate the effects of direct changes in income and employment into their total regional effects. At this point it should be of value to the reader to demonstrate some of the analytical capabilities of the input-output model. A simple example of the use of the input-output model with a hypothetical regional development planning problem is presented in the following discussion. Let us suppose that the local government can obtain funds for regional development from a federal agency. Local planners have suggested two projects which are economically feasible and have acceptable returns on investment. One project involves the construction and operation of a processing plant which makes pet food out of currently unutilized fish species. The other project is a large recreation/resort complex on the beach. The planners would now like to know which project would most benefit the region in terms of additional income and employment.

The first step is to assign all the items in the cost estimates for each project to their appropriate sectors (Tables 9 and 10). For example, construction costs for the lodge at the resort might be assigned to Construction if the contractor is located in the region and buys some materials locally; as well as to Imports for that proportion of labor and materials that is purchased outside of the region. Other expenditures are assigned to appropriate sectors based on their SIC codes and the classification scheme in the sector worksheets in Appendix A. Note that preliminary cost estimates do not usually include information on the source of the item (i.e. obtained within the region, or imported) but that some estimate of this is necessary for multiplier analysis.

At this point it is necessary to decide what proportion of the output change by these sectors is allocable to final demand as opposed to

TABLE 9

AGGREGATION OF EXPENDITURES FOR PET FOOD PLANT
INTO SECTORS IN REGIONAL MODEL

Expenditures	Sales to Final Demand (\$)	Sector
Fresh fish, petfood fish surimi fish	1,698,371	Fishery Products
Production and dry storage buildings	609,758	Construction
Cornmeal, soybean meal, vitamin premix, salt, iron oxide, sodium tripolyphos- phate, sorbitol	1,345,184	Food & Kindred
Labels, cases, freezer cartons	634,238	Paper & Allied
Sorting conveyor, ice machine	13,625	Fabricated Metals
Miscellaneous equipment and tools, fish boxes	77,170	Other Manufacturing
Electricity, steam, water, Waste Disposal	124,968	Communications and Utilities
Insurance, interest, leasing costs	130,223	Finance, Insurance Real Estate
Property tax	22,046	State & Local Gov- ernment
Labor, Maintenance, Miscel- laneous costs	*	Households
(All others)	*	Imports

* Amounts not listed because not relevant to multiplier analysis.

Source: [36].

TABLE 10

AGGREGATION OF EXPENDITURES FOR RESORT COMPLEX
INTO SECTORS IN REGIONAL MODEL

Expenditures	Sales to Final Demand (\$)	Sector
Sand, gravel, rip-rap (shore protection)	220,817	Mining
Lodge, cottages, cabins, recreation building, recreation area, bathhouse, marina, picnic areas, employee housing, maintenance area, office, roads, parking, walks, shelters, entrance, sporting goods center, swimming pool, 75% of total construction costs	5,111,148	Construction
Food, employee meals, complimentary meals	178,545	Food & Kindred
Transportation	30,873	Other Transportation
Water and sewer lines, disposal plants, water plants, electric distribution, telephone, heat, lights, water, power, garbage, miscellaneous utilities.	1,364,434	Communications & Utilities
Laundry	44,625	Other Services
Tax	57,242	State & Local Government
Salaries, Commission, tips, benefits, cash over	*	Households
Golf carts, golf clubs, resale purchases, equipment, 25% of construction costs	*	Imports

* Amounts not listed because not relevant to multiplier analysis/
Source: [37].

local sales, since only sales to final demand can be used in multiplier analysis. If matching money were to be provided by the local government (which is not a final demand sector) then some proportional or representative amount would have to be subtracted from the total output change and the remainder would represent final demand change. For simplicity, assume that Federal Government, which is a final demand sector, will provide all of the money for the regional development project. Thus, the entire cost estimate for each sector is counted as a sale to final demand.

Tables 11 and 12 show the format for multiplier analysis. To calculate the direct income change for each sector, the change in final demand is multiplied by the Household coefficient for that sector (from Table 2). Thus, for Fishery Products:

$$\$1,698,371 \times 0.41691 = \$708,068$$

To calculate the direct employment change for each sector an output-employment ratio is first derived and then divided into the final demand change. Again, for Fishery Products:

$$\$17,728,000 \text{ (Table 1)} + 1500 \text{ employees (Table A2)} = \$11,819/\text{employee.}$$

$$\$1,698,371 \text{ (Table 11)} + \$11,819/\text{employee} = 144 \text{ employees.}$$

In Table 11 the direct income change for each sector is multiplied by its income multiplier to give the impact of the given final demand change for that sector on total regional income. The same process is used with the direct employment change and the employment multiplier. Note that the total regional impact includes the direct effect as well as the indirect and induced effects. The sum of the column of income effects gives the total impact of the project on regional income, and the same applies to employment.

TABLE II
EFFECT OF PET FOOD PLANT ON REGIONAL INCOME AND EMPLOYMENT: EXAMPLE

Sector	Final Demand Change \$	Direct Income Change \$	Direct Employment Change (Persons)	Type II Multipliers		Impact on Region	
				Income	Employment	Income	Employment (Persons)
Fishery Products	1,698,371	708,068	144	3.54	2.23	2,506,561	321
Construction	609,758	186,269	14	3.42	4.13	637,040	58
Food & Kindred	1,345,184	325,978	67	5.83	3.67	1,900,452	246
Paper & Allied	634,238	96,423	13	5.30	4.20	511,042	55
Fabricated	13,625	7,219	1	2.66	2.45	19,203	2
Other Manufacturing	77,170	32,723	1	2.84	6.42	92,933	6
Communication & Utilities	124,968	44,741	3	3.15	4.64	140,934	14
Finance, Insurance, & Real Estate	130,223	20,125	2	5.00	5.37	100,625	11
State & Local Government	22,046	9,404	1	3.38	2.73	31,786	3
Total	4,655,593	1,430,950	246			5,940,576	716

TABLE 12
EFFECT OF RESORT COMPLEX ON REGIONAL INCOME AND EMPLOYMENT: EXAMPLE

Sector	Final Demand Change \$	Direct Income Change \$	Direct Employment Change (Persons)	Type II Multipliers		Impact on Region	
				Income	Employment	Income	Employment (Persons)
Sand & Gravel Mining	220,817	71,856	1	3.02	14.80	217,005	15
Construction	5,111,148	1,561,353	121	3.42	4.13	5,339,827	500
Food & Kindred	178,545	43,267	9	5.83	3.67	252,247	33
Other Transportation	30,873	11,944	1	3.16	3.53	37,743	4
Communications & Utilities	1,364,434	488,495	28	3.15	4.64	1,538,759	130
Other Services	44,625	23,317	2	2.78	3.45	64,821	7
State & Local Government	57,242	24,417	3	3.38	2.73	82,529	8
Total	7,007,684	2,224,649	165			7,532,931	697

Table 13 summarizes the results of the impact analysis from two perspectives: total effects, and effects per dollar of cost. The decision to accept one project or the other is still the responsibility of the planners; however, they now have an added dimension to their feasibility analysis--regional effects. Planners or other government officials may decide to ignore the regional effects and base their decision entirely on which project has the least operating cost or the highest rate of return. They may be constrained by the amount of money available and can only pick the less expensive project. Or perhaps they are entirely unconstrained by the total cost of the project and thus favor the one with the largest absolute magnitude of returns and effects. They may devise some formula which takes into account all the factors of investment, returns, and income and employment effects relative to socio-economic conditions in the region. The point is that many decision criteria are available to regional planners, and regional impact analysis is just one of them. It should also be apparent that impact analysis is most useful in comparing two or more projects. To use this type of analysis solely to promote the benefits of a single project would be to take it out of context.

The foregoing examples were presented to direct attention to one type of decision problem which can be analyzed by I/O models. It is certainly an oversimplification of the effort required in multiplier analysis. In the first place there is no consideration of the time element involved. A complete analysis would account for a short-term construction phase and its impact as well as a long-term operation phase. Furthermore, a detailed study of the proportion of final demand comprising the expected increase in output through time would be necessary to accurately

TABLE 13

COMPARISON OF IMPACT OF PET FOOD PLANT AND RESOTR COMPLES
ON REGION: EXAMPLE

Comparison Factor	Pet Food Plant	Resort Complex
Total Cost	\$ 4,655,593	\$ 7,007,684
Increased Regional Income	5,940,576	7,532,931
Increased Regional Employment	716 Persons	697 Persons
\$ Income/\$ Cost	1.28	1.07
Employment/\$ Million Cost	154	99

estimate the magnitude of the benefits to the region. Finally, in some cases certain sectors could be negatively affected by a change in output of the sector of interest; for example, in converting forest land to farm land some production by Forestry Products is lost. In these cases, a negative multiplier effect would have to be subtracted from the positive effect to determine the net change in output, income or employment. The U. S. Department of Agriculture has recently begun using this type of multiplier analysis in their plan evaluation process for water and related land resources and have published two reports which describe in detail the use of multiplier analysis in impact assessment [24, 29].

Traditional applications of input-output analysis have been discussed by Miernyk [30]. He classified these into four basic areas:

1. Structural analysis, which can be used to compare different economies, to project full-employment levels of production and direct resources toward industries which can most efficiently achieve these goals and to formulate market profiles.
2. Forecasting, which can be used by businesses to adjust production and employment schedules to meet projections of demand and by planners to provide general guidelines in promoting development.
3. Impact or multiplier analysis, as used in the preceding example, to quantify and incorporate total regional effects on income and employment of changes in sectorial final demand into a regional "cost-benefit" determination.
4. Feasibility tests and sensitivity analysis, to determine the feasibility of achieving certain policies and the sensitivity of different sectors to alternative growth scenarios.

SUMMARY AND CONCLUSIONS

The purpose of this report was to provide an input-output model of the Alabama coastal region based on secondary data sources, to describe the methodology used and to demonstrate some applications of the model. At this point it may be useful to review the results and suggest some conclusions which have developed from the study.

Any reader familiar with the literature on regional input-output studies cannot fail to remark that the multipliers developed from this model are comparatively large, even for a secondary database model. The standard for the average size of multipliers is set by primary database models, which claim to make no assumptions about the structure of the regional economy, whereas secondary database models start with the high degree of interdependence characterizing the national economy and attempt to reduce this interdependence in the regional economy by various adjustment procedures.

Two types of adjustments were used in this model: location quotients and transfer of industries not existing in the region to the Imports category. In most cases, these adjustments would have sufficed to bring the degree of interdependence (as represented by the multipliers) into the accepted range for secondary database models. However, in this study this was not the case. Two explanations are advanced for this outcome. First, the coefficients database used was the 85-sector 1971 National I/O model, and this did not allow sufficient resolution to remove industries at the 3- and 4-digit SIC level which did not exist in the region. Thus the coefficients for non-existing industries were aggregated with existing ones and interdependence was overstated. The extent of this problem seems to be unique to this region in that only six

out of a possible 80 industries at the 2-digit SIC level are totally absent from the region, which amounts to 93% representation. This problem might be alleviated somewhat by using the 367-sector National model which gives coefficients at the 4-digit level. However, even at this high degree of industrial detail, the region still contains 64% of the national sectors. Perhaps still more detail could be achieved by using the 485-sector National model, but the regional percentage representation is not known at this time. The main point here is that most secondary database models have achieved a degree of interdependence in the traditional range (e.g. average Type II output multipliers between 2.0 and 4.0) by using the 85-sector National model, whereas the broad representation of industries in the Alabama coastal region apparently precludes this outcome.

The second explanation deals with further adjustments through the use of location quotients. In most cases, the problem of disaggregation of non-existing industries is handled by location quotients. The principle behind this is that for every establishment which is lacking in an industrial category, a corresponding amount of employment is also lacking (relative to the same national industry category) so that the resultant employment location quotient is less than 1.00 (or less than the national average). The situation in Alabama's coastal region seems to be that employment in the existing industries within a sector makes up for the lost employment in non-existing industries within the same sector and the location quotients are still close to 1.00. In fact, while 42% of the regional sectors had location quotients less than one, the average location quotient was 0.87. Thus it seems that the coastal region not only has a great variety of industries, but within most industry categories employment approaches or exceeds the national average. It is possible

that a combination of greater disaggregation of industries and adjustment by location quotients would reduce the amount of interdependence. Nevertheless, given the accepted methodology used in this study, the multipliers appear to accurately reflect this situation of depth and diversity of economic structure which is apparently unique in the Alabama coastal model relative to other regional studies.

What does all this mean for the region? First of all, the economy is apparently in a healthy state, having a diverse industry mix. Many of the industries in the region export their products and this of course should be encouraged, especially in those sectors with high income and employment effects. But it is also important to encourage these industries to sell as much as they can within the region in order to enhance the multiplier effect. New industries should also be encouraged to locate in the region, especially industries in those sectors lacking adequate representation, such as Fabricated Metals and industries producing goods or services which must currently be imported; both of these efforts will foster more interdependence. The model, as it exists now, reflects more of the potential economic structure of the region, and the above steps would serve to realize this potential.

Improvements to the model would include a survey of imports and exports by firms in the area to free the model of some of the limiting assumptions of its secondary database. With primary data on imports and exports a better profile of sales potential would emerge with a more realistic picture of current bottlenecks in economic growth.

Finally, it is imperative to consider other factors affecting the health and well-being of a region and its inhabitants. There are certainly trade-offs between economic gains and environmental quality.

These trade-offs may require adjustments in the concept of "beneficial industries" since what is good for income and employment may be bad for the environment. The future progress of the coastal region may well hinge on the effective manipulation of development plans to enhance both the economy and the environment. It is hoped that input-output modeling will offer a positive contribution to this endeavor.

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95 pp.

APPENDIX A
SECTOR WORKSHEETS

Since the major effort in constructing an input-output model is collecting the data for the transactions table, this appendix carefully describes the sources and uses of the data collected for the model presented in this report. For the most part, the criteria followed in selecting the appropriate data were: (1) that they conform to the definitions and conventions in the national I/O model, (2) that they have a standard source for repeated data, (3) and that the data and calculations be reproducible at a later date by a definite methodology. A summary of data sources is given in Table A1.

Explanation of worksheet categories

Sector Number

The number at the top of the worksheet corresponds to the sector number used in all the regional tables in the text.

Sector Name

The name of the sector at the top of each worksheet is the regional sector name. It may be exactly the same as in the text tables or may be a more complete spelling of the table abbreviation. Most of the sector names are the same as or similar to corresponding sectors in the national I/O model (e.g. Agricultural, Forestry, and Fishery Services; Printing and Publishing). Other sector names more clearly describe the composition of industries in the sector (e.g. Crops; Sand and Gravel Mining). Some sector names simply indicate that the sector contains all sectors in that group that are not classified elsewhere (Other Manufacturing; Other Services).

Regional Dollar Output Total

The regional dollar output total is used as the row and column control for the corresponding sector in the transactions table. Output

TABLE A1

SUMMARY OF CONTROL DATA FOR ALABAMA COASTAL REGION INPUT-OUTPUT STUDY

SIC	Code Number	BFA Code Number	1972 Dollar Output (Thousands)		Employment (Source ^a)	Quotient (Type ^b)
			Source	Adjusted		
1.	Fishery Products	09				
2.	Fresh or Frozen Packaged Fish	2036	17,728		1,500	EAQ
3.	Livestock	013,pt.,014	30,888		1,000	EAQ
4.	Crops	01	15,912		500	EAQ
5.	Greenhouse & Nursery Products	02,excl.2,07	22,805		1,500	EAQ
6.	Forestry Products	2,07	6,954		500	EAQ
7.	Agriculture, Forestry & Fish Services	pt.3	4,837		60	RLS
8.	Petroleum & Natural Gas	04	1,030		206	CBP
9.	Sand & Gravel Mining	08	26,000		127	RLS
10.	Construction	09	10,516		48	CBP
11.	Food & Kindred Products	11,12	304,386	X	7,200	RLS
12.	Apparel & Textiles	14,excl.14,12	37,412	X	1,876	RLS
13.	Lumber & Wood Products	18,19	46,327	X	1,800	RLS
14.	Paper & Allied Products	20,21	58,800	X	2,100	RLS
15.	Printing & Publishing	24,25	356,374	X	7,500	RLS
16.	Chemicals, Plastics, Drugs & Paints	26	19,400		900	RLS
17.	Petroleum Refining	27,28,29,30	237,800		2,780	RLS
18.	Stone, Clay & Glass Products	31	43,300		474	RLS
19.	Fabricated Metals	35,36	31,100		600	RLS
20.	Transportation Equipment	39,40,41,42	11,000		650	RLS
21.	Other Manufacturing	59,60,61	85,900		2,742	RLS
22.	Water Transportation	1	141,500		1,984	RLS
23.	Other Transportation	65,excl.65,04	118,439	X	2,800	RLS
24.	Communications & Utilities	66,67,68	106,298		3,480	RLS
25.	Wholesale & Retail Trade	69	154,701		3,150	RLS
26.	Finance, Insurance & Real Estate	70,71	419,738	X	26,500	RLS
27.	Hotels, Personal & Repair Services	72	357,722	X	5,150	RLS
28.	Medical, Educational & Non-Profit Services	77	47,010	X	3,301	RLS
29.	Other Services	77	129,225	X	8,697	RLS
30.	State & Local Government	73,75,76	148,225	X	5,625	RLS
		79	267,243		15,225	RLS

EMPLOYMENT AND GLOSSARY FOR CONTROL DATA

a For explanation of abbreviations of data sources see Glossary

b pt. = parts of

c,d,e Employment was estimated at 2500 for all agriculture. This was subjectively distributed to livestock, crops, and greenhouses in the ratio of 1/5, 3/5, and 1/5 respectively.

f Forestry products output = nonfarm commercial timber + farm forestry. The Census of Agricultural Services was taken in the years 1969 and 1974 for the two-county region. Output for 1972 was estimated by assuming a linear increase in output. Forestry and Fisheries Services are excluded from the output total but included in technical coefficients.

g Output was adjusted for these sectors on the basis of the ratio of the data source national total to the national I/O sector total over several years. (See Appendix A, "National Dollar Output Total")

h BEA code numbers were: 16,17,22,23,24,37,38,45,50,52,57,58,62, 63,64.

i The control total was determined from the sum of each sector's sales to this sector. This estimate was found to agree with estimates made by other methods.

j Sources included both BLS and CRP

k SIC code numbers were: 22,25,30,31,35,36,359,367,369,38,39

l SIC code numbers were: 73,75,78,79,81,89

GLOSSARY

(References in brackets)

AFI - Alabama Farm Income, by counties, 1972-1973-1974 [2]

BEA - Bureau of Economic Analysis, Input-Output Table of the U. S. Economy 1971 [57]

BLS - Bureau of Labor Statistics, courtesy Mrs. Dorothy King, Office of Unemployment Compensation, Mobile, Ala. [26]

CAS - 1969 and 1974 Census of Agricultural Services [42, 43]

CRP - 1972 County Business Patterns [51]

CMI - 1972 Census of Mineral Industries [49]

COC - 1972 Census of Governments [47]

COM - 1972 Census of Manufacturers [48]

CSST - 1972 Census of Selected Service Industries [50]

EAQ - employment location quotient

GSA - Geological Survey of Alabama, courtesy Mr. Ira David George, Mineral Resources Division [10]

IRS - Internal Revenue Service, Business Income Tax Returns, Statistics of Income [38, 19, 20, 21, 22, 23]

NNPS - National Marine Fisheries Services, Current Fisheries Statistics, "Gulf Fisheries, Annual Summary, 1972"

OLQ - output location quotient

RNEO - ratio of national employment to output; assumed equal to ratio of regional employment to regional output.

figures are given in the transactions table in thousands of dollars and this is the level of precision of the output totals in the worksheet, even though the latter are given in dollars. The interpretation of the dollar output figure is given in the section on "Sector Composition".

The source of data is given using the commonly used name of the source and its reference number. Calculations are given when the employment output ratio was used. This ratio was used when output data were not available, usually because of confidentiality considerations.

National Dollar Output Total

The national dollar output total is given for use either in calculating regional output by employment, output ratio, or for calculating an Output Location Quotient. Precision is in millions or, less often, thousands of dollars. Sources are given by common names and reference numbers.

The Adjustment Factor is the result of a "data definition check" (DDC) whereby the magnitude of the national output total over several years according to the source used was compared to the output total from the national I/O models over those same years. When the difference was more than 10 percent an adjustment factor was calculated as the average ratio of the two sources and this was applied to the 1972 data from the source (e.g. IRS). This was necessary because output totals from the 1972 national I/O model were not available. The rationale for using an adjustment factor was that definitions of sector composition were different between data sources, and these differences lead to different output totals. For example, a five-year DDC showed on the average a 90 percent difference in output between the sector defined by the national model as Finance, Insurance, and Real Estate and the combined total of these three

industries as defined by the Internal Revenue Service. An example of a DDC is given for Construction (Table A2). Some rounding errors may be encountered when using figures of nine or more digits. DDC's were done for all sectors except Fishery Products, Forestry Products, and State and Local Government for which there was no comparable national I/O output data. Adjustment factors were applied in nine cases. In the remaining sectors either the average ratio was too small to justify application (e.g. many of the manufacturing sectors), or the interpretation of the adjusted output would have been unclear (e.g. the agricultural sectors).

Regional Employment Total

The regional employment total was used in the calculation of the employment multiplier and the Employment Location Quotient and in some of the employment/output ratios.

Wherever possible the source used was the Unemployment Compensation Agency in Mobile [26] which compiles standard data for the Bureau of Labor Statistics [6]. In cases where these data were not available County Business Patterns [51] was used.

National Employment Total

The national employment total was used in the estimation of regional output from employment/output ratios for some sectors and for calculating the Employment Location Quotient.

The Bureau of Labor Statistics [7] was the source of first choice. County Business Patterns [52] was used when BLS data were not available for either regional or national employment.

Location Quotient

Location quotient values are given primarily for the general interest of the reader since only location quotients less than or equal to 1.00

TABLE A2

Example of Data Definition Check (DDC)

CONSTRUCTION

(references in brackets)

In \$ Thousands

Year	BEA	IRS	BEA/IRS
1967	103,280,000 [17]	92,291,540 [18]	1.1191
1968	114,920,000 [58]	97,530,126 [19]	1.1783
1969	123,970,000 [58]	111,067,799 [20]	1.1162
1970	127,718,000 [58]	116,647,196 [21]	1.0949
1971	146,558,000 [57]	127,059,056 [22]	1.1535
1972	*	143,022,246 [23]	Avg. = 1.1324

* = $143,022,246 \times 1.1324 - 161,958,460$

(see sector worksheet No. 10)

were used in the AGGATE weighting Procedure (see Appendix C). Therefore, all location quotients in the worksheets which were greater than 1.00 were set equal to 1.00 for use with the AGGATE procedure. The rationale for this method was given by Adcock and Waldman [1].

"Any location quotient which is greater than 1 indicates in the most basic terms that that industry is an exporting industry. That is since it produces more or employs more people than the average industry employs for the domestic location in which it is set, then the excess product is exported and it becomes a net exporting industry. For those industries which had a location quotient greater than 1, we assumed that they continued to buy input products in a similar fashion to that of the average industry across the United States; therefore, any upward adjustment in the direct coefficients on the national table would indicate that that specific industry is selling more of a product, percentage-wise, to a region-specific industry than that industry can use. This assumption, of course would be unrealistic. Therefore, all location quotients which were greater than 1 were set to a constant factor of unity. This situation means that the selling industry, with a location quotient of unity, provides no more or no less than the products needed as inputs to other industries."

The location quotients for Fishery Products, Fresh or Frozen Packaged Fish, Greenhouse and Nursery Products, Forestry Products, and Water Transportation are given but were not used in constructing the transactions matrix.

The Employment Location Quotient was calculated by the following formula:

$$ELQ = \frac{\frac{E_{SR}}{E_{TR}}}{\frac{E_{SN}}{E_{TN}}}$$

where:

E_{SR} = employment for that sector for the region

E_{TR} = total regional employment

E_{SN} = employment for that sector for the nation

E_{TN} = total national employment

E_{TR} was 107,800 and E_{TN} was 73,714,000 when using data from the Bureau of Labor Statistics for E_{SR} and E_{SN}

E_{TR} was 88,241 and E_{TN} was 58,015,904 when using data from County Business Patterns for E_{SR} and E_{SN}

The notation in parentheses (BLS or CBP or Mixed) refers to the source of E_{TR} and E_{TN} . In a few cases when the sources were mixed, the location quotient was derived both ways and a weighted average was taken.

Output location quotients were used in cases where employment data were not reliable. The Output Location Quotient was calculated in the following way:

$$OLQ = \frac{\frac{O_{SR}}{O_{TR}}}{\frac{O_{SN}}{O_{TN}}}$$

where:

O_{SR} = output of the sector in the region

O_{TR} = total regional output

O_{SN} = output of the sector in the nation

O_{TN} = total national output

O_{TR} was originally estimated at \$3,068,636,000

O_{TN} was estimated for 1972 as \$3,333,431,000,000.

SIC Code Number(s)

The code numbers from the Standard Industrial Classification Manual [4] which most closely correspond to the sector composition of the direct requirements coefficients are given here. They were obtained from the table entitled "Industry Classification Used in the 1971 Input-Output Tables" [57, p. 7].

BEA 1967 or 1971 National I/O Model Number(s)

The sector number from the appropriate national model is given here. The 1967 National I/O Model [55] used here had 367 sectors and its code numbers were used to describe such sectors as Fresh or Frozen Packaged Fish, Greenhouse and Nursery Products, and Water Transportation. The 1971 National I/O Model [57] had 85 sectors and its code numbers were used to describe the remaining regional sectors except Forestry and Fishery Products. The major use of these code numbers is to determine the national sector which provided the direct requirements coefficients used in the regional model.

Sector Composition

The two sub-headings in this section differentiate between the description and interpretation of the data used for the output total (which was derived by one method) and the description of the sectors comprising

the direct requirements coefficients (which were derived by other methods). While every attempt was made to make these two compositions as similar as possible, it should be of interest to the reader to note where there are differences.

The main function of the Sector Composition of the Direct Requirements Coefficients is to give the reader an idea of the types of industries which make up the sector. The actual sectors for which direct requirements coefficients were available (in the National I/O models) may not be as disaggregated as the industries listed indicate. Furthermore, differences in sector composition of a more detailed nature are found only in the BEA publication "Definitions and Conventions of the 1967 Input-Output Study" [56].

SECTOR 1

FISHER PRODUCTS

REGIONAL DOLLAR OUTPUT TOTAL: \$17,728,000

SOURCE: National Marine Fisheries Service [14]

NATIONAL DOLLAR OUTPUT TOTAL: Not Applicable

SOURCE:

ADJUSTMENT FACTOR:

REGIONAL EMPLOYMENT TOTAL: 1500

SOURCE: National Marine Fisheries Service [14]
 Bureau of Labor Statistics--Mobile [26] = 700
 County Business Patterns [51] = 428

NATIONAL EMPLOYMENT TOTAL: 16,248

SOURCE: County Business Patterns [52]

LOCATION QUOTIENT: 17.32

TYPE: Employment (CBP) see next page.

SIC CODE NUMBER(S): 091

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): Parts of 3

SECTOR COMPOSITION:

Output Total

Value of landings of fish, shellfish and oysters

LOCATION QUOTIENT:

The location quotient was calculated using regional and national employment figures from County Business Patterns [51, 52]. National Marine Fisheries Service [14] employment data were used for the Regional Employment Total since these figures were believed to be a better yearly average, but since comparable national NMFS figures were not available

CBP data had to be used in the calculation of the location quotient to maintain consistency. Bureau of Labor Statistics [26] employment data are given for comparison purposes.

Direct Requirements Coefficients

Since landings of shrimp make up almost 83% of the value of the catch, it was assumed that the budget for a typical Gulf of Mexico shrimp trawler could be used to derive the bulk of the inputs required by this sector. Accordingly, figures from Hayenga, et al. [15] and Lacewell, et al. [27] were averaged with those from Griffin and Wardlaw [13] and allocated to appropriate input sectors. Crew shares (Households) and repairs and maintenance (Transportation Equipment) accounted for the majority of the inputs from the budgets. Additional inputs not listed in the budgets were estimated from column 3.00 in the 1967 National I/O model [55] when they could be adequately distinguished from inputs to the forestry sector. Inputs were also checked for compatibility with other studies [25].

Sector sales were estimated from row 3.00 in the 1967 National I/O model and for the most part were easily distinguished from sales by the forestry sector.

Since some of the purchases and sales coefficients were estimated from the national model, it should be noted that the sector composition of the direct requirements coefficients in these cases follows the BEA classification [57] and may also include: whale products; miscellaneous marine products; hunting, trapping, and game propagation.

SECTOR 2

FRESH OR FROZEN PACKAGED FISH

REGIONAL DOLLAR OUTPUT TOTAL: \$30,888,000

SOURCE: National Marine Fisheries Service [14]

NATIONAL DOLLAR OUTPUT TOTAL: Not Applicable

SOURCE:

ADJUSTMENT FACTOR:

REGIONAL EMPLOYMENT TOTAL: 1,000

SOURCE: National Marine Fisheries Service [14]
Bureau of Labor Statistics--Mobile [26] :
SIC 2036 = 374
SIC 2031 = 0

NATIONAL EMPLOYMENT TOTAL: 45,200

SOURCE: Bureau of Labor Statistics [7]
SIC 2031 & SIC 2036 = 45,200

LOCATION QUOTIENT: 5.66

TYPE: Employment (BLS)

SIC CODE NUMBER(S): 2036

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 14.12

SECTOR COMPOSITION:

Output Total

Value of processed products including: finfish, crabs, shrimp, oysters, shell grit and lime, cured and industrial unclassified.

Direct Requirements Coefficients

Establishments primarily engaged in preparing fresh and raw or cooked frozen packaged fish and other seafood. This industry also includes

establishments primarily engaged in the shucking and packing of fresh oysters in non-sealed containers.

The purchases and sales data for this sector were derived directly from the 1967 National I/O model (367-sector table). The Packaged Fish column in the national model was aggregated to fit the regional sector scheme and the amounts in the transactions table were converted to proportions by dividing by the column sum. Each proportion (coefficient) was then multiplied by the regional Packaged Fish output total to derive each cell in the column for the regional Packaged Fish sector. The regional Packaged Fish row was generated by first aggregating the amounts of each sector across the row in the national model (and also aggregating the appropriate column totals) then calculating the proportions of each cell in the row (by dividing by the appropriate aggregated national column total) and multiplying these proportions by the corresponding regional column total. Balancing was done at the Export cell.

The Food & Kindred column was determined by subtracting each cell in the Packaged Fish column from the corresponding cell in Food & Kindred, including Packaged Fish column (generated by the AGGATE program). The same procedure was followed for the row.

This method of coefficient derivation was also used for Greenhouse and Nursery Products (similar to Fresh or Frozen Packaged Fish) and for Crops (similar to Food & Kindred Products).

The employment location quotient was calculated using BLS data. However, the NMFS data were determined to be a better estimate of actual employment.

SECTOR 3

LIVESTOCK

REGIONAL DOLLAR OUTPUT TOTAL: \$15,912,000

SOURCE: Alabama Farm Income [2]

NATIONAL DOLLAR OUTPUT TOTAL: \$35,669,714,000

SOURCE: Farm Income Statistics [9]

ADJUSTMENT FACTOR: None

REGIONAL EMPLOYMENT TOTAL: 500

SOURCE: Calculated as 1/5 of the total farm employment,
which was estimated at 2,500.

NATIONAL EMPLOYMENT TOTAL: Not Applicable

SOURCE:

LOCATION QUOTIENT: 0.48

TYPE: Output

SIC CODE NUMBER(S): 013, Parts of 014, 0193, Parts of 0729

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 1

SECTOR COMPOSITION:

Output Total

Cash receipts from farm marketing of all livestock and poultry.

Direct Requirements Coefficients

a. dairies	g. general livestock farms
b. broiler chickens	h. animal specialties (e.g. apiaries; horse, dog, rabbit, fur, and game farms
c. poultry	i. parts of animal husbandry services not elsewhere classified
d. beef cattle	
e. hogs	
f. other livestock	

SECTOR 4

CROPS

REGIONAL DOLLAR OUTPUT TOTAL: \$22,805,000

SOURCE: Alabama Farm Income [2]

NATIONAL DOLLAR OUTPUT TOTAL: \$24,085,733,000

SOURCE: Farm Income Statistics [9]

"Crops" less "Other Forest Products" less "Greenhouse
& Nursery"

ADJUSTMENT FACTOR: None

REGIONAL EMPLOYMENT TOTAL: 1,500

SOURCE: Calculated as 2/5 of the total farm employment,
which was estimated at 2,500

NATIONAL EMPLOYMENT TOTAL: Not Applicable

SOURCE:

LOCATION QUOTIENT: 1.03

TYPE: Output

SIC CODE NUMBER(S): 011, 012, Parts of 014

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 2 (excluding 2.07)

SECTOR COMPOSITION:

Output Total

Cash receipts from farm marketing of all crops does not include non-farm commercial timber, farm forest products, or greenhouse and nursery. Crops include corn, cotton, wheat, soybeans, peanuts, tobacco, sorghum grain, hay, fruits and nuts, vegetables, and other crops.

Direct Requirements Coefficients

- a. field crops
- b. fruits, nuts, and vegetables
- c. general crop farms

See note at Fresh or Frozen Packaged Fish for method of deriving coefficients.

SECTOR 5

GREENHOUSE & NURSERY PRODUCTS

REGIONAL DOLLAR OUTPUT TOTAL: \$6,944,000

SOURCE: Alabama Farm Income [2]

NATIONAL DOLLAR OUTPUT TOTAL: \$1,120,956,000

SOURCE: Farm Income Statistics [9]

Excludes Mushrooms

ADJUSTMENT FACTOR: None

REGIONAL EMPLOYMENT TOTAL: 500

SOURCE: Calculated as 1/5 of the total farm employment,
which estimated at 2,500

NATIONAL EMPLOYMENT TOTAL: Not Applicable

SOURCE:

LOCATION QUOTIENT: 6.73

TYPE: Output

SIC CODE NUMBER(S): 019, Parts of 014

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 2.07

SECTOR COMPOSITION:

Output Total

Cash receipts for farm marketing of greenhouse and nursery.

Direct Requirements Coefficients

a. horticultural specialties (bulbs, florists; greens, herbs, mushrooms,
vegetables, flower seeds, and sod crops)

b. parts of general farms

See note at Fresh or Frozen Packaged Fish for method of deriving coefficients.

SECTOR 6

FORESTRY PRODUCTS

REGIONAL DOLLAR OUTPUT TOTAL:	<u>\$4,837,000</u>
SOURCE: Alabama Farm Income [2]	
NATIONAL DOLLAR OUTPUT TOTAL:	<u>Not Applicable</u>
SOURCE:	
ADJUSTMENT FACTOR:	
REGIONAL EMPLOYMENT TOTAL:	<u>60</u>
SOURCE: Bureau of Labor Statistics--Mobile [26]	
County Business Patterns [51]	
NATIONAL EMPLOYMENT TOTAL:	<u>6,534</u>
SOURCE: County Business Patterns [52]	
LOCATION QUOTIENT:	<u>0.90</u>
TYPE: Employment (CBP)	
SIC CODE NUMBER(S): 081, 082, 084, 086	
BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): Parts of 3	
SECTOR COMPOSITION:	

Output Total

Cash receipts from farm marketing of non-farm commercial timber and farm forestry.

Direct Requirements Coefficients

- a. Timber tracts
- b. Forest nurseries and tree seed gathering and extracting
- c. Gathering of gums and barks
- d. Gathering of forest products not elsewhere classified
(e.g. gathering of Spanish moss, spaghnum moss, and tung nuts.)

The Forestry column was, for the most part, calculated as the residual after the subtraction of the Fishery column from a Forestry/Fishery column generated by AGGATE. The Forestry row was derived in the same manner as the Fishery row: when cell entries in the national model could be distinguished as unique to Forestry the entire amount was assigned to Forestry, and in cases where both Forestry and Fishery might contribute the entry was distributed to the two sectors in proportion to their total output.

SECTOR 7

AGRICULTURAL, FORESTRY, AND FISHERY SERVICES

REGIONAL DOLLAR OUTPUT TOTAL: \$3,030,000

SOURCE: Census of Agricultural Services [42, 43]

Estimated by assuming a linear increase in output
between 1969 and 1974

NATIONAL DOLLAR OUTPUT TOTAL: Not Applicable

SOURCE:

ADJUSTMENT FACTOR:

REGIONAL EMPLOYMENT TOTAL: 206

SOURCE: County Business Patterns [51]

NATIONAL EMPLOYMENT TOTAL: 181,462

SOURCE: County Business Patterns [52]

LOCATION QUOTIENT: 0.75

TYPE: Employment (CBP)

SIC CODE NUMBER(S): 071, 0723, 073, Parts of 0729, 085, 098

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S):

SECTOR COMPOSITION:

Output Total

Total gross receipts from establishments primarily engaged in providing
agricultural services.

Direct Requirements Coefficients

- a. cotton ginning and compressing
- b. grist mills including custom flour mills
- c. corn shelling, hay baling, and threshing services

- d. contract sorting, grading, and packing of fruits and vegetables for others
- e. agricultural services not elsewhere classified (e.g. crop dusting, farm management, contract plowing and harvesting)
- f. poultry hatcheries
- g. horticultural services
- h. parts of animal husbandry services
- i. forestry services
- j. fish hatcheries, farms, and preserves

SECTOR 8

PETROLEUM & NATURAL GAS

REGIONAL DOLLAR OUTPUT TOTAL:	<u>\$26,000,000</u>
SOURCE: Census of Mineral Industries [49]	
Data is for Mobile County only. Data for Baldwin County either nonexistent, not disclosed, or less than \$500,000	
NATIONAL DOLLAR OUTPUT TOTAL:	<u>\$15,690,800,000</u>
SOURCE: Census of Mineral Industries [49]	
ADJUSTMENT FACTOR: None	
REGIONAL EMPLOYMENT TOTAL:	<u>127</u>
SOURCE: Bureau of Labor Statistics--Mobile [26]	
NATIONAL EMPLOYMENT TOTAL:	<u>Not Applicable</u>
SOURCE:	
LOCATION QUOTIENT:	<u>1.80</u>
TYPE: Output	
SIC CODE NUMBER(S):	1311, 1321
BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S):	8
SECTOR COMPOSITION:	

Output Total

Value of shipments and receipts of oil and gas extraction (SIC 13) including oil and gas field services.

Direct Requirements Coefficients

- a. Establishments primarily engaged in operating oil and gas field properties (e.g. exploration, drilling, equipping wells, oil shale and and oil sands extraction).

- b. Establishments primarily engaged in producing liquid hydrocarbons from oil and gas field gases.

SECTOR 9

SAND & GRAVEL MINING

REGIONAL DOLLAR OUTPUT TOTAL: \$10,516,000

SOURCE: Geological Survey of Alabama [10]

Census of Mineral Industries [49]

"All minerals" (GSA) less "oil and gas" (COM): \$36,516,000

- \$26,000,000 = \$10,516,000

NATIONAL DOLLAR OUTPUT TOTAL: \$4,941,874,000

SOURCE: Statistical Abstract of the U. S. [53]

Sum of cement, sand and gravel, stone, and clays

ADJUSTMENT FACTOR: None

REGIONAL EMPLOYMENT TOTAL: 48

SOURCE: County Business Patterns [51]

"All mining" less "oil and gas field services"

NATIONAL EMPLOYMENT TOTAL: Not Applicable

SOURCE:

LOCATION QUOTIENT: 2.31

TYPE: Output

SIC CODE NUMBER(S): 141, 142, 144, 145, 148, 149

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 9

SECTOR COMPOSITION:

Output Total

- a. Cement
- b. Stone
- c. Sand and Gravel
- d. Clay

Direct Requirements Coefficients

- a. Dimension stone
- b. Crushed and broken stone
- c. Sand and gravel
- d. Clay, ceramic, and refractory minerals
- e. Nonmetallic minerals (except fuel) services
- f. Miscellaneous nonmetallic minerals except fuel

SECTOR 10

CONSTRUCTION

REGIONAL DOLLAR OUTPUT TOTAL: \$304,386,000

SOURCE: Employment:output ratio

$$\frac{7,200}{3,831,000} = \frac{x}{161,958,460,000}$$

NATIONAL DOLLAR OUTPUT TOTAL: \$161,958,460,000

SOURCE: Internal Revenue Service [18, 19, 20, 21, 22, 23]

Bureau of Economic Analysis [17, 58, 57]

ADJUSTMENT FACTOR:

Sum of proprietorships, partnerships, and corporations =

\$143,022,246,000

5-year BEA/IRS average = 1.1324 x \$143,022,300,000 =

\$161,958,460,000

REGIONAL EMPLOYMENT TOTAL: 7,200

SOURCE: Bureau of Labor Statistics--Mobile [26]

NATIONAL EMPLOYMENT TOTAL: 3,831,000

SOURCE: Bureau of Labor Statistics [7]

LOCATION QUOTIENT: 1.29

TYPE: Employment (BLS)

SIC CODE NUMBER(S): Parts of 138, 15, 16, 17, Parts of 6561

BEA 1969 OR 1971 NATIONAL I/O MODEL NUMBER(S): 11, 12

SECTOR COMPOSITION:

Output Total

IRS national output total is for contract construction, total of all business (prop., part., & corp.), business receipts.

Direct Requirements Coefficients

- a. Parts of Oil and Gas Field Services
- b. Building Construction (contract)
- c. Other Construction (contract) (e.g. highway and street, heavy construction)
- d. Special Trade Contractors (e.g. plumbing, painting, electrical, carpentry, etc.)
- e. Parts of Operative Builders (not contractors) (e.g. condominium developers, speculative builders).

SECTOR 11

FOOD & KINDRED PRODUCTS

(Excluding Sector 2)

REGIONAL DOLLAR OUTPUT TOTAL: \$37,412,000

SOURCE: Census of Manufacturers [48]
 Food & Kindred (COM) less Fresh or Frozen Packaged Fish (NMFS)

NATIONAL DOLLAR OUTPUT TOTAL: Not Applicable

SOURCE:

ADJUSTMENT FACTOR:

REGIONAL EMPLOYMENT TOTAL: 1,876

SOURCE: Bureau of Labor Statistics--Mobile [26]

SIC	20	2250
SIC	2036	<u>-374</u>
		1876

NATIONAL EMPLOYMENT TOTAL: 1,693,800

SOURCE: Bureau of Labor Statistics [7]

LOCATION QUOTIENT: 0.76

TYPE: Employment (BLS)

SIC CODE NUMBER(S): all of 20 except 2036

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): all of 14
 except 14.12

SECTOR COMPOSITION:

Output Total

Value of shipments of food and kindred products less the value of processed fishery products.

Direct Requirements Coefficients

Establishments manufacturing foods and beverages for human consumption and certain related products such as manufactured ice, chewing gum, vegetable and animal fats and oils, and prepared feeds for animals and fowls.

(For derivation of coefficients see note at Fresh or Frozen Packaged Fish.)

SECTOR 12

APPAREL & TEXTILES

REGIONAL DOLLAR OUTPUT TOTAL: \$46,327,000

SOURCE: Employment:Output ratio

$$\frac{1800}{1,374,000} = \frac{x}{35,373,133,000}$$

NATIONAL DOLLAR OUTPUT TOTAL: \$35,373,133,000

SOURCE: Internal Revenue Service [18, 19, 20, 21, 22]

Bureau of Economic Analysis [17, 57, 58]

ADJUSTMENT FACTOR:

Sum of proprietorships, partnerships, and corporations =

\$28,396,189,000

5-year BEA/IRS average = 1.2457 x \$28,396,189,000 = \$35,373,133,000

REGIONAL EMPLOYMENT TOTAL: 1,800

SOURCE: Bureau of Labor Statistics--Mobile [26]

NATIONAL EMPLOYMENT TOTAL: 1,374,000

SOURCE: Bureau of Labor Statistics [7]

LOCATION QUOTIENT: 0.90

TYPE: Employment (BLS)

SIC CODE NUMBER(S): 225, 23, 39996, 239

BEA 1969 OR 1971 NATIONAL I/O MODEL NUMBER(S): 18, 19

SECTOR COMPOSITION:

Output Total

The sum of: Proprietorships (business receipts from businesses with and without profits); Partnerships (receipts); and All Corporations (business receipts from returns with and without net income) for Apparel and Other

Textile Products adjusted to represent the valuation of gross output in producers' prices.

Direct Requirements Coefficients

- a. Knitting mills
- b. Apparel and other finished products made from fabrics and similar material
- c. The manufacturing activities of custom tailor and furrier trade establishments

SECTOR 13

LUMBER & WOOD PRODUCTS

REGIONAL DOLLAR OUTPUT TOTAL:	<u>\$59,800,000</u>
SOURCE: Census of Manufacturers [48]	
NATIONAL DOLLAR OUTPUT TOTAL:	<u>Not Applicable</u>
SOURCE:	
ADJUSTMENT FACTOR:	
REGIONAL EMPLOYMENT TOTAL:	<u>2,100</u>
SOURCE: Bureau of Labor Statistics--Mobile [26]	
NATIONAL EMPLOYMENT TOTAL:	<u>622,600</u>
SOURCE: Bureau of Labor Statistics [7]	
LOCATION QUOTIENT:	<u>2.31</u>
TYPE: Employment (BLS)	
SIC CODE NUMBER(S): 24	
BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 20, 21	
SECTOR COMPOSITION:	

Output Total

Value of shipments of lumber and wood products

Direct Requirements Coefficients

- a. Logging camps and logging contractors
 - b. Sawmills and planing mills
 - c. Millwork, veneer, plywood and prefabricated structural wood products
 - d. Wooden containers
 - e. Miscellaneous wood products (e.g. wood preserving, turning and shaping of wood)
-

SECTOR 14

PAPER & ALLIED PRODUCTS

REGIONAL DOLLAR OUTPUT TOTAL: \$356,374,000

SOURCE: Employment:output ratio

$$\frac{7550}{688,900} = \frac{x}{32,517,325,000}$$

NATIONAL DOLLAR OUTPUT TOTAL: \$32,517,325,000

SOURCE: Internal Revenue Service [19, 20, 21, 22, 23]

Bureau of Economic Analysis [57, 58]

ADJUSTMENT FACTOR:

Sum of corporations = \$26,436,850,000

Approximate 4-year BEA/IRS average = 1.23 x \$26,436,850,000

= \$32,517,325,000

REGIONAL EMPLOYMENT TOTAL: 7,550

SOURCE: Bureau of Labor Statistics--Mobile [26]

NATIONAL EMPLOYMENT TOTAL: 688,900

SOURCE: Bureau of Labor Statistics [7]

LOCATION QUOTIENT:

TYPE: Employment (BLS)

SIC CODE NUMBERS(S): 26

BEA 1967 OR 1971 NATIONAL L/O MODEL NUMBER(S): 24, 25

SECTOR COMPOSITION:

Output Total

Business receipts from returns from All Corporations (with and without net income) for Paper and Allied Products, adjusted to represent the valuation of gross output in producers' prices.

Direct Requirements Coefficients

- a. Pulp mills
 - b. Paper mills
 - c. Paper board mills
 - c. Converted paper and paperboard products
 - e. Paperboard containers and boxes
 - f. Building paper and building board mills
-

SECTOR 15

PRINTING & PUBLISHING

REGIONAL DOLLAR OUTPUT TOTAL:	<u>\$19,400,000</u>
SOURCE: Census of Manufacturers [48]	
NATIONAL DOLLAR OUTPUT TOTAL:	<u>Not Applicable</u>
SOURCE:	
ADJUSTMENT FACTOR:	
REGIONAL EMPLOYMENT TOTAL:	<u>900</u>
SOURCE: Bureau of Labor Statistics--Mobile [26]	
NATIONAL EMPLOYMENT TOTAL:	<u>1,084,200</u>
SOURCE: Bureau of Labor Statistics [7]	
LOCATION QUOTIENT:	<u>0.57</u>
TYPE: Employment (BLS)	
SIC CODE NUMBER(S): 27	
BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 26	
SECTOR COMPOSITION:	

Output Total

Value of shipments of printing and publishing

Direct Requirements Coefficients

a. Newspapers	h. Blankbooks, looseleaf binders,
b. Periodicals	bookbinding and related work
c. Books	i. Service industries for the print-
d. Miscellaneous publishing	ing trade (e.g. typesetting,
e. Commercial printing	photoengraving)
f. Manifold business forms	
g. Greeting card publishing	

SECTOR 16

CHEMICALS, PLASTICS, DRUGS, PAINTS

REGIONAL DOLLAR OUTPUT TOTAL:	<u>\$237,800,000</u>
SOURCE: Census of Manufacturers [48]	
NATIONAL DOLLAR OUTPUT TOTAL:	<u>Not Applicable</u>
SOURCE:	
ADJUSTMENT FACTOR:	
REGIONAL EMPLOYMENT TOTAL:	<u>2,750</u>
SOURCE: Bureau of Labor Statistics--Mobile [26]	
NATIONAL EMPLOYMENT TOTAL:	<u>1,007,500</u>
SOURCE: Bureau of Labor Statistics [7]	
LOCATION QUOTIENT:	<u>1.87</u>
TYPE: Employment (BLS)	
SIC CODE NUMBER(S): 28	
BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 27, 28, 29, 30	
SECTOR COMPOSITION:	

Output Total

Value of shipments of Chemicals and Allied Products

Direct Requirements Coefficients

- a. Industrial inorganic and organic chemicals
 - b. Plastic materials, synthetic resins, synthetic rubber, and other man-made fibers except glass
 - c. Drugs
 - d. Soap, detergents, and cleaning preparations, perfumes, cosmetics and other toilet preparations
 - e. Paints, varnishes, lacquers, enamels, and allied products
-

f. Gum and wood chemicals

g. Agricultural chemicals

h. Miscellaneous chemical products (e.g. adhesives, explosives, ink)

SECTOR 17

PETROLEUM REFINING AND RELATED INDUSTRIES

REGIONAL DOLLAR OUTPUT TOTAL:	<u>\$43,300,000</u>
SOURCE: Census of Manufacturers [48]	
NATIONAL DOLLAR OUTPUT TOTAL:	<u>Not Applicable</u>
SOURCE:	
ADJUSTMENT FACTOR:	
REGIONAL EMPLOYMENT TOTAL:	<u>474</u>
SOURCE: Bureau of Labor Statistics--Mobile [26]	
NATIONAL EMPLOYMENT TOTAL:	<u>194,400</u>
SOURCE: Bureau of Labor Statistics [7]	
LOCATION QUOTIENT:	
TYPE: Employment (BLS)	
SIC CODE NUMBER(S): 29	
BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 31	
SECTOR COMPOSITION:	

Output Total

Value of shipments of petroleum and coal products

Direct Requirements Coefficients

- a. Petroleum refining
- b. Paving mixtures and blocks
- c. Asphalt felts and coatings
- d. Miscellaneous products of petroleum and coal

SECTOR 18
STONE, CLAY, & GLASS PRODUCTS

REGIONAL DOLLAR OUTPUT TOTAL:	\$31,300,000
SOURCE: Census of Manufacturers [48]	
NATIONAL DOLLAR OUTPUT TOTAL:	Not Applicable
SOURCE:	
ADJUSTMENT FACTOR:	
REGIONAL EMPLOYMENT TOTAL:	600
SOURCE: Bureau of Labor Statistics--Mobile [26]	
NATIONAL EMPLOYMENT TOTAL:	658,900
SOURCE: Bureau of Labor Statistics [7]	
LOCATION QUOTIENT:	0.62
TYPE: Employment (BLS)	

SIC CODE NUMBER(S): 32

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 35, 36

SECTOR COMPOSITION:

Output Total

Value of shipments of stone, clay, glass products

Direct Requirements Coefficients

- | | |
|--|--|
| a. Flat glass | e. Structural clay products |
| b. Glass and glassware, pressed
or blown | f. Pottery and related products |
| c. Glass products made of purchased
glass | g. Concrete, gypsum, and plaster
products |
| c. Cement, hydraulic | h. Cut stone and stone products |

- i. Abrasive, asbestos, and miscellaneous non-metallic mineral products

SECTOR 19

FABRICATED METALS

REGIONAL DOLLAR OUTPUT TOTAL: \$11,000,000

SOURCE: Census of Manufacturers [48]

NATIONAL DOLLAR OUTPUT TOTAL: Not Applicable

SOURCE:

ADJUSTMENT FACTOR:

REGIONAL EMPLOYMENT TOTAL: 650

SOURCE: Bureau of Labor Statistics--Mobile [26]

NATIONAL EMPLOYMENT TOTAL: 1,395,900

SOURCE: Bureau of Labor Statistics [7]

LOCATION QUOTIENT: 0.32

TYPE: Employment (BLS)

SIC CODE NUMBER(S): 34

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 39, 40, 41, 42

SECTOR COMPOSITION:

Output Total

Value of shipments of fabricated metal products

Direct Requirements Coefficients

- a. Metal cans
- b. Cutlery, hand tools, and general hardware
- c. Heating apparatus (except electrical) and plumbing fixtures
- d. Fabricated structural metal products
- e. Screw machine products, bolts, nuts, screws, rivets, and washers
- f. Metal stampings

- g. Coating, engraving, and allied services
 - h. Miscellaneous fabricated wire products
 - i. Miscellaneous fabricated metal products
-

SECTOR 20

TRANSPORTATION EQUIPMENT

REGIONAL DOLLAR OUTPUT TOTAL: \$85,900,000

SOURCE: Census of Manufacturers [48]

NATIONAL DOLLAR OUTPUT TOTAL: Not Applicable

SOURCE:

ADJUSTMENT FACTOR:

REGIONAL EMPLOYMENT TOTAL: 2,742

SOURCE: Bureau of Labor Statistics--Mobile [26]

NATIONAL EMPLOYMENT TOTAL: 1,771,700

SOURCE: Bureau of Labor Statistics [7]

LOCATION QUOTIENT: 1.06

TYPE: Employment (BLS)

SIC CODE NUMBER(S): 37

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 59, 60, 61

SECTOR COMPOSITION:

Output Total

Value of shipments of transportation equipment

Direct Requirements Coefficient

- a. Motor vehicles and motor vehicle equipment
- b. Aircraft and parts
- c. Ship and boatbuilding and repair
- d. Railroad equipment
- e. Motorcycles, bicycles, and parts
- f. Miscellaneous transportation equipment, (e.g. trailers, campers, wagons)

SECTOR 21

OTHER MANUFACTURING

REGIONAL DOLLAR OUTPUT TOTAL: \$141,500,000

SOURCE: See accompanying note

NATIONAL DOLLAR OUTPUT TOTAL: Not Applicable

SOURCE:

ADJUSTMENT FACTOR:

REGIONAL EMPLOYMENT TOTAL: 1,984

SOURCE: Bureau of Labor Statistics--Mobile [26]

Total manufacturing employment less sectors 11 - 20 = employment

23,800 - 21,816 = 1984

NATIONAL EMPLOYMENT TOTAL: 6,406,900

SOURCE: Bureau of Labor Statistics [7]

LOCATION QUOTIENT: 0.21

TYPE: Employment (BLS)

SIC CODE NUMBER(S): 221, 222, 223, 224, 226, 227, 228, 229, 23, 30, 31,
33, 353, 358, 359, 367, 369, 38, 39

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 16, 17, 22, 23, 32, 34,
37, 37, 38, 45, 50, 52, 57, 58, 62, 63, 64

SECTOR COMPOSITION:

Output Total

Value of shipments of "all industries: less value of shipments of regional sectors 11 - 20.

Value of shipments for all manufacturing industries in the region was given in the Census of Manufacturers [48] as \$1,043,400,000. The subtotal for regional manufacturing sectors 11 - 20 was \$901,900,000. The

difference was assumed to be the value of shipments of Other Manufacturing. The output totals for Apparel and Paper which were used in the manufacturing sector subtotal were re-estimated from national census data rather than from IRS data, in order for the "value of shipments" descriptor to be consistent.

SECTOR COMPOSITION:

Direct Requirements Coefficient

- a. Broad woven fabric mills, cotton
- b. Broad woven fabric mills, synthetic fiber and silk
- c. Broad woven fabric mills, wool: including dyeing and finishing
- d. Narrow fabrics and smallwares mills; cotton, wool, silk and synthetic fiber
- e. Dyeing and finishing textiles, except wool fabrics and knitted goods
- f. Floor covering mills
- g. Yarn and thread mills
- h. Miscellaneous textile goods
- i. Furniture and fixtures
- j. Rubber and miscellaneous plastics products
- k. Leather and leather products
- l. Primary metal industries
- m. Construction, mining, and materials handling machinery and equipment
- n. Service industry machines
- o. Miscellaneous machinery, except electrical
- p. Electronic components and accessories
- q. Miscellaneous electrical machinery, equipment, and supplies
- r. Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks

s. Miscellaneous manufacturing industries (e.g. jewelry, musical instruments, toys, amusements, sporting and athletic goods)

Goods produced by manufacturing industries not included in sectors 11 - 21 were assumed to be imported.

SECTOR 22

WATER TRANSPORTATION

REGIONAL DOLLAR OUTPUT TOTAL: \$118,439,000

SOURCE: Employment:output ratio

$$\frac{2800}{208,600} = \frac{x}{8,823,670,240}$$

NATIONAL DOLLAR OUTPUT TOTAL: \$8,823,670,240

SOURCE: Internal Revenue Service [18]

ADJUSTMENT FACTOR:

Sum of proprietorships, partnerships, and corporations =

\$5,315,464,000

1967 BEA/IRS average = 1.66 x \$5,315,464,000 = \$8,823,670,240

REGIONAL EMPLOYMENT TOTAL: 2,800

SOURCE: Bureau of Labor Statistics--Mobile [26]

NATIONAL EMPLOYMENT TOTAL: 208,600

SOURCE: Bureau of Labor Statistics [7]

LOCATION QUOTIENT: 9.18

TYPE: Employment (BLS)

SIC CODE NUMBER(S): 44

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 65.04

SECTOR COMPOSITION:

Output Total

Business receipts from all businesses for Water Transportation, adjusted to represent the valuation of gross output in producers' prices.

Direct Requirements Coefficients

- a. Deep-sea foreign transportation
- b. Deep-sea domestic transportation
- c. Great Lakes - St. Lawrence Seaway transportation
- d. Transportation on rivers and canals
- e. Local water transportation
- f. Services incidental to water transportation (e.g. cargo handling, ship cleaning)

SECTOR 23

OTHER TRANSPORTATION

REGIONAL DOLLAR OUTPUT TOTAL: \$108,298,000

SOURCE: Employment:output ratio

$$\frac{3,480}{2,443,100} = \frac{x}{74,625,545,000}$$

NATIONAL DOLLAR OUTPUT TOTAL: \$74,625,545,000

SOURCE: Internal Revenue Service [23]

ADJUSTMENT FACTOR:

Sum of proprietorships, partnerships, and corporations for Transportation, communications and utilities less contribution from Water transportation, and Communications and Utilities. No adjustment factor.

REGIONAL EMPLOYMENT TOTAL: 3,480

SOURCE: Bureau of Labor Statistics--Mobile [26]

LOCATION QUOTIENT: 0.97

TYPE Employment (BLS)

SIC CODE NUMBER(S): 40, 41, 42, 45, 46, 47

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 65 (excluding 65.04)

SECTOR COMPOSITION:

Output Total

Business receipts from all businesses for Transportation, communications, electric, gas, and sanitary services less water transportation, communication, electric, gas and sanitary services.

Direct Requirements Coefficients

- a. Railroad Transportation
 - b. Local and Suburban Passenger Transportation
 - c. Motor Freight Transportation and Warehousing
 - d. Air Transportation
 - e. Pipe Line Transportation
 - f. Transportation Services
-

SECTOR 24

COMMUNICATION & UTILITIES

REGIONAL DOLLAR OUTPUT TOTAL:	<u>\$154,701,000</u>
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SOURCE: Employment:output ratio

$$\frac{3150}{1,864,900} = \frac{x}{91,588,166,000}$$

NATIONAL DOLLAR OUTPUT TOTAL:	<u>\$91,588,166,000</u>
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SOURCE: Internal Revenue Service [23]

ADJUSTMENT FACTOR:

Sum of proprietorships, partnerships, corporations for communications, electric, gas, and sanitary services.

No adjustment factor.

REGIONAL EMPLOYMENT TOTAL:	<u>3150</u>
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SOURCE: Bureau of Labor Statistics--Mobile [26]

NATIONAL EMPLOYMENT TOTAL:	<u> </u>
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SOURCE: Bureau of Labor Statistics [7]

LOCATION QUOTIENT:	<u>1.16</u>
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TYPE: Employment (BLS)

SIC CODE NUMBER(S): 48, 49

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 66, 67, 68

SECTOR COMPOSITION:

Output Total

Business receipts from all business for communication plus electric, gas, and sanitary services.

Direct Requirements Coefficients

a. Telephone Communication

- b. Telegraph Communication
 - c. Radio and Television Communication
 - d. Communication Services
 - e. Electric Companies
 - f. Gas Companies
 - g. Combination Companies
 - h. Water Supply
 - i. Sanitary Services
 - j. Steam Supply
 - k. Irrigation System
-

SECTOR 25

WHOLESALE & RETAIL TRADE

REGIONAL DOLLAR OUTPUT TOTAL: \$419,738,000

SOURCE: Employment:output ratio

$$\frac{26,500}{15,975,000} = \frac{x}{253,031,000,000}$$

NATIONAL DOLLAR OUTPUT TOTAL: \$253,031,000,000

SOURCE: Internal Revenue Service [18, 19, 20, 21, 22, 23]

Bureau of Economic Analysis [17, 57, 58]

ADJUSTMENT FACTOR:

Sum of proprietorships, partnerships, and corporations =

\$821,530,273,000

Five-year BEA/IRS average = 0.318 x \$821,530,273,000 =

\$253,031 x 10⁶

REGIONAL EMPLOYMENT TOTAL: 26,500

SOURCE: Bureau of Labor Statistics--Mobile [26]

NATIONAL EMPLOYMENT TOTAL: 15,975,000

SOURCE: Bureau of Labor Statistics [7]

LOCATION QUOTIENT: 1.13

TYPE: Employment (BLS)

SIC CODE NUMBER(S): 50, 52, 53, 54, 55, 56, 57, 58, 59, 7396, Part of
8099

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 69

SECTOR COMPOSITION:

Output Total

Business receipts for all business for wholesale and retail trade adjusted

to represent the valuation of gross margins (operating expenses plus profits) for the reselling activities of wholesale and retail establishments [57].

Direct Requirements Coefficients

- a. Wholesale Trade
 - b. Building Materials, Hardware and Farm Equipment Dealers
 - c. Retail Trade - General Merchandise
 - d. Food stores
 - e. Automotive Dealers and Gasoline Service Stations
 - f. Apparel and Accessory Stores
 - g. Furniture, Home Furnishings, and Equipment Stores
 - h. Eating and Drinking Places
 - i. Miscellaneous Retail Stores
 - j. Trading Stamp Stores
 - k. Parts of Health and Allied Services, not elsewhere classified
-

SECTOR 26

FINANCE, INSURANCE & REAL ESTATE

REGIONAL DOLLAR OUTPUT TOTAL: \$357,722,000

SOURCE: Employment:output ratio

$$\frac{5150}{3,943,000} = \frac{x}{273,882,830}$$

NATIONAL DOLLAR OUTPUT TOTAL: \$273,882,830,000

SOURCE: Internal Revenue Service [18, 19, 20, 21, 22, 23]

Bureau of Economic Analysis [17, 57, 58]

ADJUSTMENT FACTOR

Sum of proprietorships, partnerships, and corporations =

\$150,295,142,000

Five-year BEA/IRS average = 1.8223 x \$150,295,142,000 =

\$273,882,830,000

REGIONAL EMPLOYMENT TOTAL: 5,150

SOURCE: Bureau of Labor Statistics--Mobile [26]

NATIONAL EMPLOYMENT TOTAL: 3,943,000

SOURCE: Bureau of Labor Statistics [7]

LOCATION QUOTIENT: 0.89

TYPE: Employment (BLS)

SIC CODE NUMBER(S): 60, 61, 62, 63, 64, 65, 66, 67 (excluding part of
6561)

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 70, 71

SECTOR COMPOSITION:

Output Total

Business receipts for all business for finance, insurance and real estate

adjusted to conform to BEA definitions of output from these industries [56].

Direct Requirements Coefficients

- a. Banking
 - b. Credit Agencies Other than Banks
 - c. Security and Commodity Brokers, Dealers, Exchanges and Services
 - d. Insurance Carriers
 - e. Insurance Agents, Brokers, and Service
 - f. Real Estate (excluding part of Operative Builders)
 - g. Combinations of Real Estate, Insurance, Loans, and Law Offices
 - h. Holding and Other Investment Companies
-

SECTOR 27

HOTELS, PERSONAL & REPAIR SERVICES

REGIONAL DOLLAR OUTPUT TOTAL: \$47,010,000

SOURCE: Census of Selected Service Industries [50]

NATIONAL DOLLAR OUTPUT TOTAL: Not Applicable

SOURCE: Census of Business, Selected Services [44, 45, 46]

Bureau of Economic Analysis [12, 16, 17]

ADJUSTMENT FACTOR

Three-year (1958, 1963, 1967) average BEA/Census ratio = 0.902

REGIONAL EMPLOYMENT TOTAL: 3,301

SOURCE: Bureau of Labor Statistics--Mobile [26]

County Business Patterns [5]

NATIONAL EMPLOYMENT TOTAL: 1,867,666

SOURCE: Bureau of Labor Statistics [7]

County Business Patterns [52]

LOCATION QUOTIENT: 1.20

TYPE: Employment (mixed)

SIC CODE NUMBER(S): 70, 72, 76 (excluding 7692, 7694, and part of 7699)

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 72

SECTOR COMPOSITION:

Output Total

Receipts from all establishments engaged in: hotels, motels, trailer parks, camps, personal services, and miscellaneous repair services are adjusted to represent value of output from this sector as defined by BEA [57].

Direct Requirements Coefficients

- a. Hotels, Rooming Houses, Camps and Other Lodging places
- b. Personal Services
- c. Miscellaneous Repair Services, excluding Welding Repair, Armature Rewinding Shops, and part of Repair Shops and Related Services, not elsewhere classified

REGIONAL OUTPUT:

<u>SIC #</u>	<u>Sector</u>	<u>Receipts (\$x10³)</u>
70	Hotels, motels, trailer parks, camps	\$17,503
72	Personal services	\$23,175
76	Miscellaneous repair services	<u>\$11,440</u>
Census output x adjustment factor		\$52,118
$\$52,118 \times 10^3 \times 0.902 = \$47,010 \times 10^3$		

EMPLOYMENT:

<u>SIC #</u>		<u>Regional (source)</u>		<u>National (source)</u>	
70	Hotels, etc.	1500	(BLS-M)	868,300	(BLS)
72	Personal services	1591	(BLS-M)	909,100	(BLS)
76	Misc. repair ser.	610	(CBP)	212,509	(CBP)
	Subtotal	<u>3701</u>		<u>1,989,909</u>	
	less 769 Welding & Elect. Rep.	<u>-400</u>	(CBP)	<u>-122,243</u>	(CBP)
	Total	3301		1,867,666	

Note: Employment from CBP was used where data from BLS was not available.

SECTOR 28

MEDICAL, EDUCATIONAL SERVICES, AND NONPROFIT ORGANIZATIONS

REGIONAL DOLLAR OUTPUT TOTAL \$129,225,000

SOURCE: Employment:output ratio

$$\frac{8205}{5,448,295} = \frac{x}{85,808,000,000}$$

NATIONAL DOLLOAR OUTPUT TOTAL: \$85,808,000,000

SOURCE: Interval Revenue Service [18, 19, 20, 21, 22, 23]

Bureau of Economic Analysis [17, 57, 58]

ADJUSTMENT FACTOR:

Sum of proprietorships, partnerships, and corporations =

\$34,627,840,000

Five-year BEA/IRS average = 2.478 x \$34,627,840,000

= \$85,808,000,000

REGIONAL EMPLOYMENT TOTAL: 8697

SOURCE: Bureau of Labor Statistics--Mobile [26]

Employment data from County Business Patterns [51] = 8205 was
used to calculate output and location quotient

NATIONAL EMPLOYMENT TOTAL: 5,448,295

SOURCE: County Business Patterns [52]

LOCATION QUOTIENT: 0.99

TYPE: Employment (CBP)

SIC CODE NUMBER(S): 0722, 80 (excluding part of 8099), 82, 84, 86, 8921

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 77

SECTOR COMPOSITION:

Output Total

Business receipts from all businesses for offices of physicians and surgeons, plus offices of dentists and dental surgeons, plus other medical services, plus educational services, adjusted to represent value of output from this sector as defined by BEA [56].

Direct Requirements Coefficients

- a. Offices of Veterinarians and Animal Hospitals
 - b. Medical and Other Health Services (excluding part of Health and Allied Services not elsewhere classified)
 - c. Educational Services
 - d. Museums, Art Galleries, Botanical and Zoological Gardens
 - e. Nonprofit Membership Organizations
 - f. Nonprofit Educational and Scientific Research Agencies
-

SECTOR 29

OTHER SERVICES

REGIONAL DOLLAR OUTPUT TOTAL:	<u>\$148,225,000</u>
SOURCE: Census of Selected Service Industries [50] and employment: output ratios	
NATIONAL DOLLAR OUTPUT TOTAL:	<u>Not Applicable</u>
SOURCE:	
ADJUSTMENT:	
REGIONAL EMPLOYMENT TOTAL:	<u>5625</u>
SOURCE: Bureau of Labor Statistics--Mobile [26] County Business Patterns [51]	
NATIONAL EMPLOYMENT TOTAL	<u>3,803,721</u>
SOURCE: Bureau of Labor Statistics [7] County Business Patterns [52]	
LOCATION QUOTIENT:	<u>1.01</u>
TYPE: Employment (BLS)	
SIC CODE NUMBER(S): 73 (excluding 7396), 7692, 7694, parts of 7699, 81 89 (excluding 8921), 75, 78, 79	
BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 73, 75, 76	
SECTOR COMPOSITION:	

Output Total

Receipts from auto repair and from amusements were adjusted with appropriate factors to conform to BEA [57] definitions. Output from business services, legal services, and architectural and engineering services was estimated from ratios of national employment to BEA value of output for this sector.

Direct Requirements Coefficients

- a. Miscellaneous Business Services (excluding Trading Stamp Services)
- b. Welding Repair
- c. Armature Rewinding Shops
- d. Part of Repair Shops and Related Services not elsewhere classified
- e. Legal Services
- f. Miscellaneous Services excluding Nonprofit Educational and Scientific Research Agencies
- g. Automobile Repair, Automobile Services, and Garages
- h. Motion Pictures
- i. Amusement and Recreation Services (except Motion Pictures)

Regional sector #29, Other Services is comprised of the following BEA national sectors:

- (1) BEA sector #73, Business services
- (2) BEA sector #75, Automobile repair and services
- (3) BEA sector #76, Amusements

Output from Business Services was estimated from national output: employment ratios as follows (steps I - IV):

I. National Employment in BEA sector #73 in 1970 (CBP) (BLS):

Sectors Comprising BEA		
<u>SIC #</u>	<u>Business Services</u>	<u>1970 Employment</u>
73	Misc. business serv.	1,631,633
Less 7396	Trading stamp serv.	-5,841
769	Misc. repair shops	117,277
81	Legal serv.	237,464
89	Misc. serv.	590,452
Less 892	Nonprofit educ. & sci. res.	<u>-101,608</u>
TOTAL		<u>2,469,377</u>

II. National output of Business Services in 1970 [58] = \$68,991,000,000

$$\text{Output:employment ratio} = \frac{\$68,991,000,000}{2,469,377}$$

$$= \$27,939 \text{ per person}$$

III. Regional employment in Business Services in 1972 [26,51]

Sectors Comprising		
<u>SIC #</u>	<u>Business Services</u>	<u>1972 Employment</u>
73	Misc. business services	1868
769	Misc. repair shops (Mobile Co.	400
81	Legal services	422
89	Misc. services	798
Less 892 & 899	Nonprofit research	<u>-28</u>
TOTAL		3460

IV. Regional output of Business Services

Regional employment (III) x National output:employment ratio (II) 3460 persons x \$27,939/person = \$96,669 x 10³

Output from Auto Repair and Amusements was derived from the Census of Selected Service Industries [50], and each sector was then adjusted by an appropriate factor.

V. Receipts from Automotive Repair [50] = \$18,884,000

Three-year (1958, 1963, 1967) average BEA/census ratio = 2.05

$$\text{Output} = \$18,884,000 \times 2.05 = \$38,712 \times 10^3$$

VI. Receipts from Amusements [50] = \$11,267,000

Three-year (1958, 1963, 1967) average BEA/census ratio = 1.14

$$\text{Output} = \$11,267,000 \times 1.14 = \$12,844 \times 10^3$$

VII. Regional output for other services was derived from the sum of

IV, V, and VI:

<u>Sector</u>	<u>Output, \$ x 10³</u>
Business Services	\$ 96,669
Auto Repair	38,712
Amusements	12,844
	<u>148,225</u>
	\$148,225

Regional and national employment figures were derived as much as possible from BLS data in order to be compatible for use in calculation of the location quotient.

VIII. Regional employment in Other Services:

Other Services (BLS)	5253
Misc. repair shops (CBP)	400
Less Nonprofit research (CBP)	<u>-28</u>
	5625

IX. National employment in Other Services:

<u>SIC #</u>	<u>Sector</u>	<u>Employment (Source)</u>
73	Misc. business serv.	1,736,600 (BLS)
75	Auto repair	405,871 (CBP)
78	Motion pictures	203,700 (BLS)
79	Amusement	467,716 (CBP)
81	Legal	266,700 (BLS)
89	Engineering & Architecture	718,000 (BLS)
768	Misc. repair shops	122,243 (CBP)
Less 892	Nonprofit research & educ.	-111,800 (BLS)
Less 7396	Trading stamp services	<u>-5,309 (CBP)</u>
		3,803,721

SECTOR 30

STATE & LOCAL GOVERNMENT

REGIONAL DOLLAR OUTPUT TOTAL: \$267,000,000

SOURCE: Census of Governments [47]

Local Area Personal Income [54]

Row Total proportioning of S & L G purchases [57]

NATIONAL DOLLAR OUTPUT TOTAL: Not Applicable

SOURCE:

ADJUSTMENT FACTOR: None

REGIONAL EMPLOYMENT TOTAL: 15,225

SOURCE: Bureau of Labor Statistics--Mobile [26]

NATIONAL EMPLOYMENT TOTAL: 10,656,000

SOURCE: Bureau of Labor Statistics [7]

LOCATION QUOTIENT: 0.98

TYPE: Employment (BLS)

SIC CODE NUMBER(S): 92, 93

BEA 1967 OR 1971 NATIONAL I/O MODEL NUMBER(S): 79

SECTOR COMPOSITION:

Output Total

Amount of local government finances from revenue from own sources and intergovernmental revenue from state, plus SLG purchases.

Direct Requirements Coefficients

Provided by Mr. Peter Trenchi and Dr. Warren Flick, Department of Forestry, Auburn University, Auburn, Ala.

APPENDIX B
FINAL DEMAND AND FINAL PURCHASES

Final Demand ColumnsFederal Government

Entries in the Federal Government column were derived from column coefficients in the 1971 National I/O Model [57]. The entries were originally calculated as the sum of "Federal Government enterprises" and "Federal Government purchases." Some adjustments were then made to balance the table. There was no control total for the column, just the sum of the individual entries.

Households

These entries were calculated from the 1971 national coefficients for Personal Consumption expenditures and then adjusted in the balancing phase. The column control total was calculated as follows:

Total labor and proprietors income	
by place of work [57]	\$978,289,000
Dividends, interest, and rent	176,229,000
Transfer payments	163,718,000
Household row control total	= 1,318,236,000

Household row total x National Average Propensity to Consume*
 = Household column control total
 $\$1,318,236,000 \times .8 = \$1,054,589,000$

* National Average Propensity to Consume = Consumption Expenditures +
 Total U. S. Personal Income where: Consumption Expenditures =
 Personal income minus taxes and savings.

$$\text{National APC [38]} = \frac{747.3}{939.2} = .8$$

Exports

Each entry in the exports column is the difference between the row control total and the sum of all other entries in the corresponding row.

Thus, it represents the "residual sales" for each row. In the case of the four sectors for which the exports entry is zero prior to balancing there was more demand than those sectors could supply so in the balancing phase they were assumed to have no exports.

Final Purchases Rows

Federal Government

The entries in this row came from coefficients provided by Mr. Peter Trenchi and Dr. Warren Flick, Department of Forestry, Auburn University, Auburn, Ala., from a survey of businesses throughout the state. The row total is simply the sum of the individual entries.

Households

The entries in the Household row came from "Hotels," etc) (Hotels proportion of Services output) = Medical, etc. V. A. coefficient) (Medical proportion of Services output) + (Other Services V. A. coefficient) (Other Services proportion of Services output)

$$191,000 = [(.594) (.14) + (.712) (.40) + (.545) (.46)]$$

$$191,003 = [.083 = .285 = .251]$$

$$191,003 = [.619$$

$$= 308567$$

$$308567 \times .083 = 25,611 \qquad \text{Hotels, etc.}$$

$$308567 \times .285 = 87,942 \qquad \text{Medical, etc.}$$

$$308567 \times .251 = \underline{77,450} \qquad \underline{\text{Other Services}}$$

$$191,003 \qquad \text{Services}$$

The Household row entry at the Exports column represents "transfer payments" from personal income data, plus a small amount of residual. The Household row control total is the sum of total labor and proprietors income by place of work, plus dividends, interest, rent, and transfer payments.

APPENDIX C

AGGREGATION, REGIONALIZATION, AND
BALANCING OF TRANSACTIONS MATRIX

Several steps were involved in construction of the transactions matrix. Data collected on the sector worksheets (Appendix A) were used in a computer program to generate the bulk of the endogenous matrix. These data were transferred to a large master sheet, other data were added, and the rows and columns were made to balance to produce the final regional transactions table.

A detailed description of each step follows:

1. The computer program, called AGGATE, was written by William H. Smith, Center for Business and Economic Services, Troy State University, Troy, Ala. AGGATE contains the direct requirements table and the sector output totals from the 1971 National I/O model [57] as well as the software for aggregating and regionalizing the transactions table.
 2. The user must provide AGGATE with a sector aggregation scheme (i.e. assign each national sector to its corresponding regional sector) as well as a regional output control total and a location quotient for each sector.
 3. AGGATE reproduces the endogenous portion of the national transactions table by multiplying each direct requirements coefficient in a column by that sector's output total.
 4. AGGATE aggregates all rows and columns from the national table which belong to the same regional sector. For this study it aggregated an 82 x 83 matrix into a 29 x 29 version of the same national table.
 5. Each column is then divided by its output total to produce the "Aggregated Direct Requirements Table."
-

6. Each cell in a row from the above table is then multiplied by the location quotient for that row to produce an intermediate matrix.
7. Each cell in a column in the intermediate matrix is then divided by the sum of the cells in that column to produce the "Regionalized Direct Requirements Table." The sum of the entries in each column in this table always add up to unity, a requirement for this type of table.
8. Each cell in each column in the Regionalized Direct Requirements Table is then multiplied by the regional output control total for that sector to produce the unbalanced "Regionalized Transactions Table." This table is unbalanced because it lacks the Final Demand columns, and thus the row totals do not equal their corresponding column totals.
9. The Regionalized Direct Requirements Table is transferred to a master sheet with extra columns and rows for sectors to be added.
10. "Sub-sectors" are split out from their parent sectors using their column and row coefficients from the 1967 National I/O model [55] (e.g. sub-sector "Fresh or Frozen Packaged Fish" is separated from parent sector "Food & Kindred Products"). Sectors with no national counterpart are also added at this time (e.g. Fishery Products).
11. The Final Demand Columns "Federal Government" and "Households" are added to the master sheet.
12. Sectors which have row totals larger than their control totals are identified. For these sectors exports are set equal to

zero and each entry in the row is reduced proportionally such that their sum is then equal to the control total. The quantity of products supplied by these sectors is assumed to be less than the quantity demanded by the other sectors in the region so that they have nothing to export, and the other sectors must import the difference between their demand and supply.

13. For all sectors whose row totals are smaller than their control totals, the difference is assigned to the corresponding cell in the Exports column.
14. The Household row is added to the master sheet.
15. The sum of the entries in each column is subtracted from the control total. The difference (which in all cases was positive) is assigned to the corresponding cell in the Imports row.

The Transactions Matrix for the region is now balanced and complete.

APPENDIX D
ASSUMPTIONS AND LIMITATIONS

Since this study uses a static input-output model it suffers from the two limitations of static models of any kind: one, current data for the model is not obtainable instantaneously; and two, by definition it does not adjust for changes over time. Thus, the underlying assumption is that since the structure of the model is constant (in our case the matrix of direct requirements coefficients) it must remain constant over a period of time in order for us to use it. This assumption is equivalent to the concept in economics of the "short run," where some costs are fixed (as opposed to the long run where no costs are fixed). In the model, all costs are expected to remain fixed in proportion to the level of output in the short run. This leads to a number of other assumptions [40]:

- (1) There are constant returns to scale (i.e. there is no "economy of scale").
- (2) There can be no substitution of inputs from one sector for inputs from another, thus, imports can only be "non-competing," (i.e. the only things imported are those which are not produced in the region).
- (3) There are no joint products (i.e. two sectors cannot produce the same thing).
- (4) Price ratios remain constant over time (i.e. prices increase in all sectors by the same percentage each year).

While these assumptions are not realistic, studies have shown that input-output models predict fairly well in the short run, compared to other types of economic models [34]. To quote Theil [39, p. 61], "To the extent that the ratios are not really constant, our assumption is wrong, but to the extent that they remain more or less constant, we shall obtain

results which are more or less accurate."

The above assumptions apply to all static input-output models, survey and non-survey. Non-survey models require other assumptions or modifications to make them comparable to survey models in the reliability of their results. The main assumption is that regional production relationships are similar to the national average. Modifications such as the location quotient method attempt to make this assumption more realistic, but despite these efforts non-survey models rarely give the same results as survey models [35]. The major difference is reflected in the size of the multipliers: non-survey multipliers are usually larger than those from surveys done in the same region. The reason is that "leakages" from the region, particularly exports, are not well accounted for, and this forces a greater degree of trading among industries within the region than actually occurs. Imports and exports are usually calculated as residuals left over when all other inputs are accounted for and are thus net figures. If gross figures are used, for every incremental increase in exports there would be an equivalent increase in an import somewhere else, and vice versa, as production "leaks" out of the economy. Multipliers would thus become smaller if gross figures were used [32]. A method of incorporating survey data on imports and exports into a non-survey model has been proposed by Miller and Liu [21] to compensate for differences between the two types of models.

A final comment on limitation encountered in building the model deals with the size of the National I/O model that was aggregated for the regional model. The 1971 updated national model was used to match the coefficients as closely as possible to the base year (1972). Unfortunately, coefficients were only provided for 83 sectors at the

2-digit SIC code level, whereas the original survey done in 1967 provided data for 450 sectors at the 4- to 6-digit SIC level. A much greater degree of "regionalization" could have been obtained by matching the mining and manufacturing industries listed by 7-digit SIC code in the Industry Directory [41] with the most detailed corresponding sector in the national survey. In this way, more sectors which did not exist in the region could have been aggregated into the Imports sector [3, 33]. The overall effect would have been to decrease the size of the multipliers.

